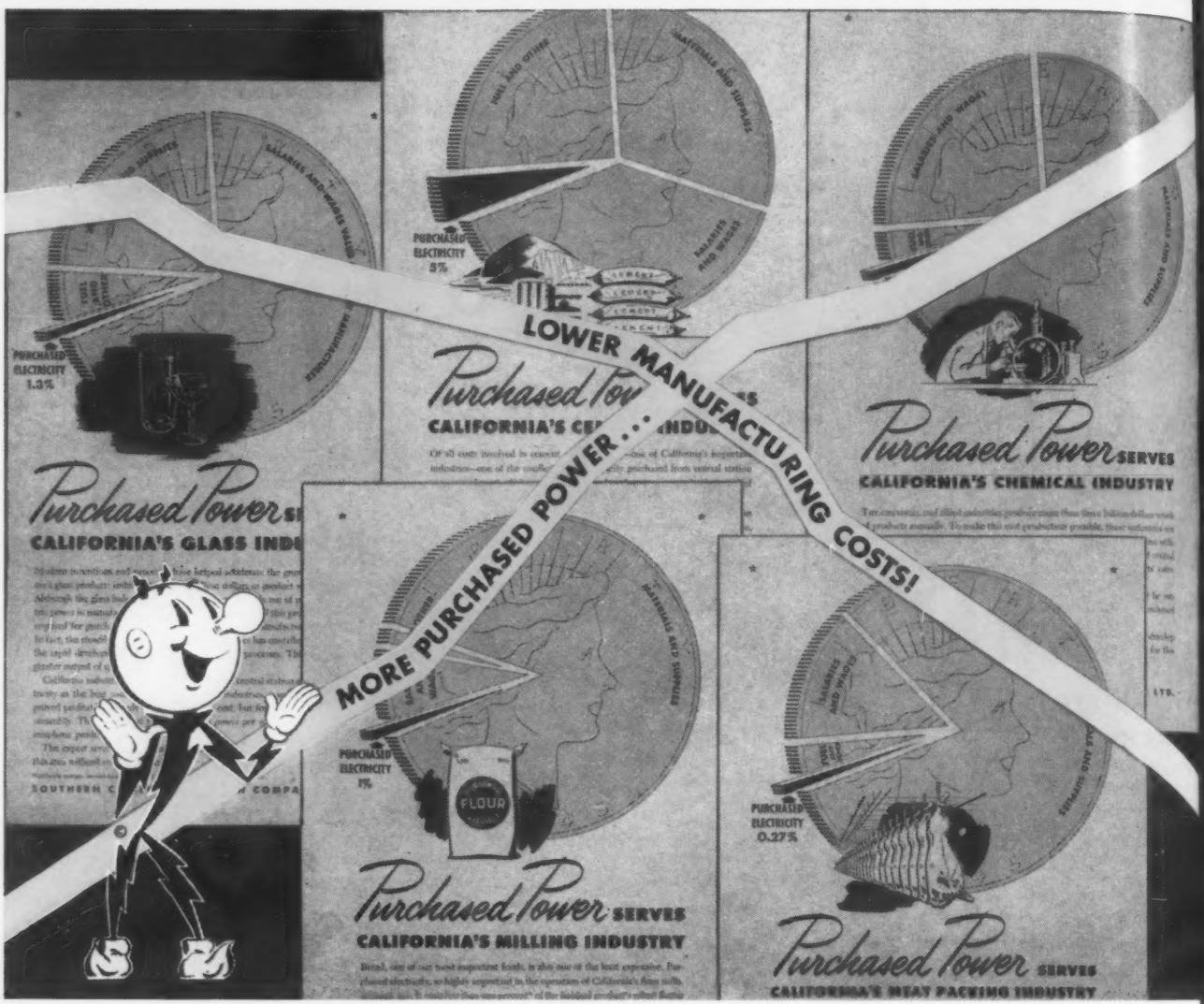
ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

BUY VICTORY BONDS

NOVEMBER 1945
25c A COPY



SERVING *Southern California* INDUSTRY

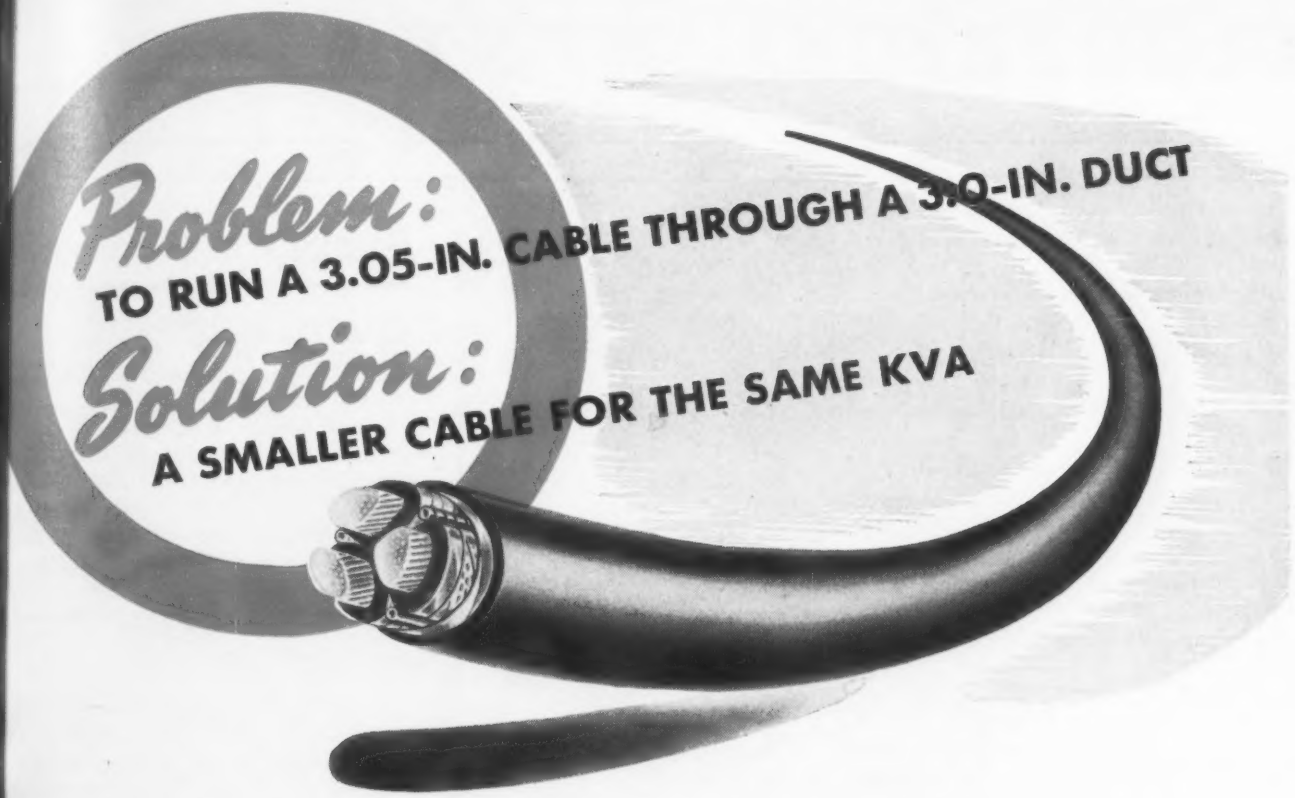
Greater productivity and lower manufacturing costs is industry's remarkable record for the past several years . . . a pattern of progress which has contributed largely to America's high living standards.

The electrical industry can take pride in the fact that the constantly growing use of low cost power purchased from electrical utilities has helped make this record possible. In 1929, industry used 2.9 kilowatt hours of purchased power per manhour . . . in 1940, *five* kilowatt hours per manhour. Yet purchased power represents only a small fraction of total manufacturing costs.

For many months, the Edison Company has told this story in a series of advertisements, some of them shown here, in the Wall Street Journal. Edison industrial engineers help all types of large or small factories in Edison-served territory to develop their electrical methods and equipment.

SOUTHERN CALIFORNIA Edison

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), November, 1945. Vol. 95, No. 5. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rates: U.S., U.S. Possessions and Latin American Republics: $2, 1 year; $3, 2 years; $4, 3 years. Canada: $2.50, 1 year; $4, 2 years; $5, 3 years. Other countries: $3, 1 year; $5, 2 years; $6, 3 years. Single copy, 25c. Copyright, 1945. McGraw-Hill Company of California. All rights reserved.



G-E GAS-FILLED CABLE MET THIS CHALLENGING NEED FOR NEW ENGLAND UTILITY

Additional load demand in one section of the city created a problem for the Hartford Electric Light Company. The need was for a new cable to carry at least 15,000 kva. The only available duct along part of the route, however, was one having an inside clear diameter of 3 inches in some sections.

Various sizes and types of cable were considered, but most were ruled out by the mechanical limitations of the duct even when it was rodded to 3¼ inches. The 27-kv, 500,000-cir mil solid-type paper-insulated cable which would have done the job had an outside diameter of 3.05 inches. This did not allow sufficient clearance for pulling.

The choice was G-E gas-filled cable—27-kv, 500,000-cir mil, having a maximum diameter of 2.8 inches. More than 18,000 feet was soon installed, and service has been uninterrupted ever since.

In addition to solving the immediate problem posed by size, other benefits were obtained:

1. GAS-FILLED CABLE IS SELF SUPERVISING. When a leak occurs, an alarm is actuated by a simple pressure relay. Valving additional nitrogen into the cable protects it, and keeps the cable in service until it is convenient to make repairs.

2. FAILURES AND SERVICE INTERRUPTIONS ARE MINIMIZED. Pressure is maintained at low, uniform level (10 to 15 lb per sq in.) inside the cable. There are no destructive pressure rises during load cycles and temperature changes.

3. NO PROFILE PROBLEMS. Unlike solid-type cable, there is no migration of compound on either steep grades or vertical risers.

4. AMPLE OVERLOAD MARGIN. A 15 per-cent overload in gas-filled cable imposes no excessive internal stresses on the lead sheath.

5. LOW INSTALLATION AND MAINTENANCE COSTS. Gas-filled cable costs little if any more to install than solid type. Ease of locating breaks through direction of gas-flow keeps maintenance cost low.

For more information on General Electric gas-filled cable, write for Bulletin GEA-3652. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

Gas-pressure regulating equipment for gas-filled cable system

GENERAL ELECTRIC

GAS-FILLED CABLE

Keep on buying BONDS—and keep all you buy

ELECTRICAL WEST

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CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

People

Daniel I. Anzini,

electrical engineer in the industrial division of the San Francisco office of General Electric Co., was responsible for the selection and application of electrical apparatus supplied by his company for wind tunnels at Ames Aeronautical Laboratory at Moffett Field. He has drawn from his intimate familiarity with the job to describe its many interesting features on page 69.

J. A. Hill,

domestic utilization engineer of Pacific Gas and Electric Co. rates as an expert in the field of heating and ventilating and air conditions which gives him the practical experience from which to discuss the fundamentals of house insulation on page 76.

Homer C. Bender

is co-author of an article on page 73 on a thermal storage system for electric house heating. He is engineer in the dealer sales department of the Washington Water Power Co. and is an authority on electric house heating.

Preview

Distribution System Economies by O. B. Falls, Jr., promised for this issue, had to be held over until December. The article will deal with the economies effected by regulators and shunt capacitors on lines in light load areas. In another engineering article Stanley Rapp of Pacific Tel. & Tel. is going to give present status of the Bell plan to use carrier on rural power lines for combined electric and telephone service. Installations of a new protected trolley in a number of industrial plants where cranes and monorails have previously used exposed bare trolley will likewise be pictured and described. In the sales pages the regular Sales Guide will reappear, the first newsletter Sales Guide being in this issue (pp. 11-12), also reports of important recent meetings of Rocky Mountain Electrical League, and Southern California Radio and Appliance Dealers.

In 9 out of 10 American homes

Betty Crocker

WOMEN KNOW BETTY CROCKER... SHE CAN MAKE SALES FOR YOU

9 out of 10 American housewives use one or more General Mills products . . . buy them regularly. Betty Crocker and her Home Service Staff do a large part of this selling . . . by offering friendly practical help to homemakers. The million letters they write to her every year reveal the faith women have in her and in the products she recommends.

The millions who listen regularly to Betty Crocker's broadcasts prove the continuing loyalty of her following. This loyalty and confidence pay off in sales . . . 400,000,000 packages of General Mills products last year.

Betty Crocker's active sponsorship of General Mills Home Appliances will put the full force of her influence directly into your business . . . will uncover new, growing markets . . . create ever-richer profit potentials for you.

COUNT ON GREAT THINGS FROM GENERAL MILLS

Count on distinguished appliances . . . new in design . . . different in basic operating principles . . . with practical features that mean greater usability and value for homemakers. Count on vigorous support for dealers . . . through aggressive advertising and alert merchandising and selling action. Count on profits.

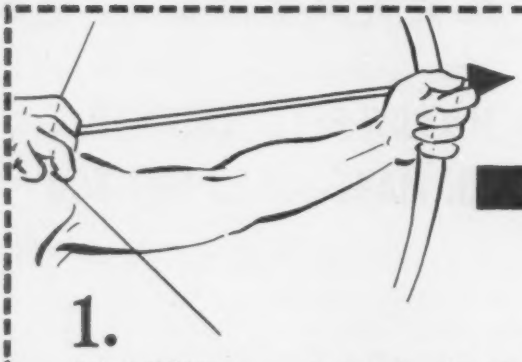
General Mills makes news

BETTY CROCKER IS A REGISTERED TRADE MARK OF GENERAL MILLS, INC.

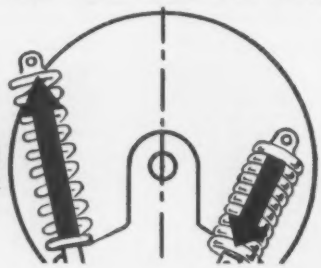
GENERAL MILLS, INC., HOME APPLIANCE DEPARTMENT • MINNEAPOLIS 13, MINNESOTA

The "Quick-Break" Principle Explained

WHAT IT IS — HOW IT IS USED IN ALLIS-CHALMERS 5/8% STEP REGULATORS TO GIVE YOU CLOSER REGULATION AT LOWEST POSSIBLE COST



ENERGY STORED-UP

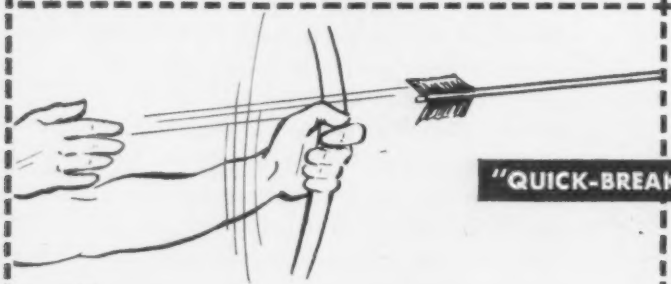


1.

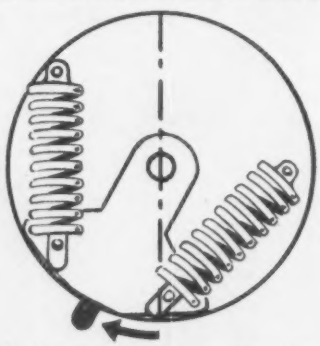
AN ARCHER is employing the "Quick-Break" principle when he stores up energy in his bow, by gradually pulling back the bowstring. Energy thus stored in the bow is available for sudden release.

2.

SIMILARLY, The Allis-Chalmers tap-changing mechanism applies the "Quick-Break" principle, by gradually storing up energy for a quick tap change, in a pair of *balanced* driving springs.



"QUICK-BREAK" RELEASE



3.

UPON RELEASE of the bowstring, all of the stored energy in the archer's bow is applied instantly. This "Quick-Break" principle is just the opposite of the slow-breaking principle employed by the javelin-thrower, who applies energy as it is generated.

4.

IN THE A-C tap-changing mechanism, quick release of built-up spring energy separates contacts with a *snap action,* in contrast to slow-breaking types of mechanism. Since the arc exists for only a *brief instant,* arcing doesn't burn or pit contacts.

"QUICK-BREAK" PRINCIPLE MEANS LOW MAINTENANCE, EXCEPTIONALLY LONG CONTACT LIFE

WITH ARCING reduced to a minimum by "Quick-Break" contact separation, contacts on Allis-Chalmers 5/8% Step Regulators may be expected to last as long as the regulator is in use. As a matter of record, no current-carrying contact has ever been replaced on an Allis-Chalmers 5/8% Step Regulator, due to deterioration in normal service.

OTHER LOW MAINTENANCE PRINCIPLES: 1) Unit construction of A-C 5/8% Step Regulators, eliminates 78 bolted connections; 2) Oil immersion of all moving parts keeps parts dust-free, eliminates need for lubrication; 3) Feather-Touch control, with voltage integration, eliminates holding coils, sealing-in switches.

Get the full story on economical 5/8% Step Regulators for all voltages by writing for Bulletins B6056A and B6065, ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

1930

FEATURE BY FEATURE

The Design Leader

In beauty, in construction, and in those *extra* advantages that make first-rate talking points, the new Electromaster electric ranges have outstanding *customer appeal.*

ENGINEERED

By Specialists

As a specialist in electric ranges and water heaters, Electromaster offers a proven product, a recognized trade name, and sound merchandising support.

DELIVERY IN QUANTITIES

Soon

Two models—the Banquet and the Space Saver—are in production *now.* A limited number of dealerships are still available.

Even More To Come

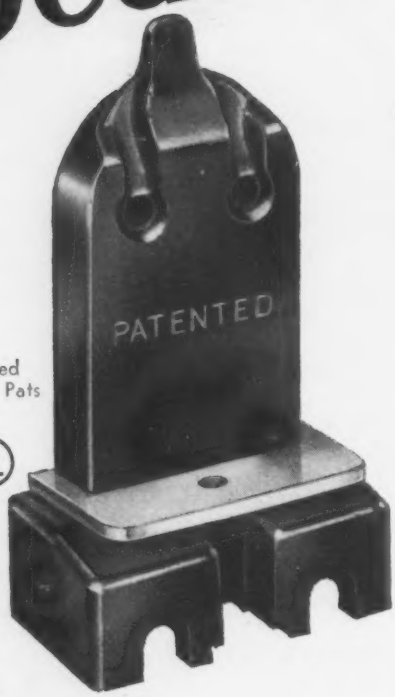
In the future—as now—Electromaster will be first in design, with new models styled by George W. Walker, noted industrial designer.

FOR THE BEST IN COOKING - *Electricity* • FOR THE BEST IN ELECTRIC COOKING

Electromaster

DETROIT 31, MICHIGAN

Unbeatables



Patented
Other Pats
Pend.

Pat. Nos.
2200443
2228210

Lloyd { Flex-Loc lampholder / Automatic Starter

FLEX-LOC Lamp Holder

FLEXIBLE — Automatic — self-adjusting to variations in lengths of lamps or spacing of mounting holes. Engineered to fit all standard spacings.

AUTOMATIC LOCK is positive. No need for extra locking devices. Lamp cannot fall out. Contacts cannot loosen.

EASY insertion and removal. No twisting. No turning. No fussing to seat lamp in holder. FLEX-LOC does the work automatically. As lamp pins slide up to terminal holes, holder is flexed outward. As pins enter holes, holder snaps inward, internal spring returning to normal.

PERFECT ELECTRICAL CONTACT — Newly designed, patented terminals grip BOTH sides of lamp pins . . . make sure and positive contact.

Listed and Approved by Underwriters' Laboratories Inc.

Automatic Starter

Positively cuts out deactivated, flickering, blinking lamps.

When trouble is detected the starter automatically cuts off current to the ballast and lamp.

Gives long life to ballast because defective lamp is locked out. Prevents overheating.

When Lloyd AUTOMATIC locks out defective lamp—turn off the current—remove defective lamp—put in a new lamp. Allow at least one minute to make above changes. Turn on current. The starter automatically lights the new lamp.

The life of the AUTOMATIC starter is many times greater than that of the average lamp.

It saves maintenance costs and power consumption, protects and insures longer life to ballast and lamp.

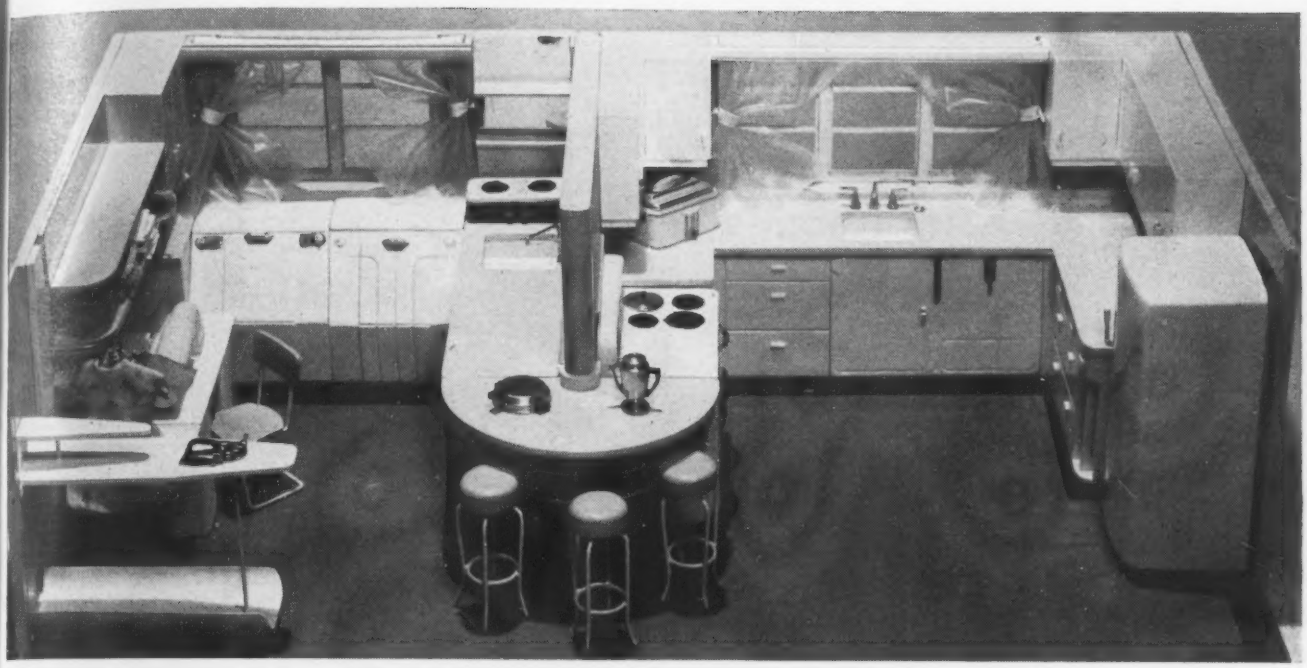
Certified by Electrical Testing Lab., Spec. 6

Lloyd Policy Insures Quality

LLOYD PRODUCTS CO.

Providence 5, R. I.

Branch Offices and Warehouses in 27 Leading Cities



The Westinghouse Combination Kitchen-Laundry Offers Retailers an "Exclusive" Promotion

No development in electric appliance history ever received such enthusiastic acceptance as has the Westinghouse Combination Kitchen-Laundry. Retailers have been quick to sense its tremendous cash register possibilities. By promoting it they will be able to sell an increased volume of Westinghouse appliances and home equipment. Practical help is ready in the form of a complete local promotion which ties in with the magazine and radio advertising now blanketing the country. Here's what the promotion package includes:

BEAUTIFUL WINDOW DISPLAY features Combination Kitchen-Laundry. Has three dimension cutout features.

FULL COLOR CONSUMER FOLDER for duplicating the Combination Kitchen-Laundry. Construction, equipment and wiring details included.

JUMBO WALL POSTER reproduces in full color illustration shown in magazine advertisement.

WINDOW STREAMER invites prospects into retailer's store for free planning folder.

NEWSPAPER AD GUIDE contains complete ads as well as drop-in units featuring the Combination Kitchen-Laundry.

GET THE FULL DETAILS OF THIS AND OTHER HOT PROMOTIONS FROM YOUR WESTINGHOUSE APPLIANCE DISTRIBUTOR

Every house needs

Westinghouse

MAKER OF 30 MILLION ELECTRIC HOME APPLIANCES

WESTINGHOUSE ELECTRIC CORPORATION • *Plants in 25 Cities . . . Offices Everywhere* • APPLIANCE DIVISION • MANSFIELD, OHIO

Tune in John Charles Thomas, Sunday 2:30 EST., N.B.C. • Hear Ted Malone, Monday through Friday, 11:45 A. M. EST., American Broadcasting Company Network

Versatility-Plus !

BULLDOG BUSTRIBUTION DUCT FOR "PLUG-IN" POWER . . . ANY TIME . . . AT ANY POINT

Conversion goes on ALL THE TIME in industrial plants—not just during or after a war.

Production lines must constantly be re-arranged to meet new or altered manufacturing schedules. Machines may work in many different locations during their service lifetime.

With old-type *fixed* outlet systems, re-wiring to accommodate these changes is slow and costly. Not with BullDog BUStribution Duct—the original "plug-in" system gives you electrical power *whenever* and *wherever* you need it.

This system—result of half a century of leadership in the electrical distribution field—gives you the finest *flexible* set-up for all your power needs. It's *plus* in everything but price—100% salvable, too.

Investigate BUStribution Duct for *your* plant. Consult BullDog field engineers or write us direct.

BUY VICTORY BONDS

BULLDOG

SALVAGE PAPER

DETROIT 32, MICHIGAN.
In Canada:
BullDog Electric Products of Canada, Ltd., Toronto.
Field Offices in All Principal Cities.

ELECTRIC PRODUCTS COMPANY

Also Manufacturers of
Vacu-Break Safety Switches — SafToFuse Panelboards—Switchboards—Circuit Master Breakers — Industrial Trol-E-Duct for moving "loads"—Universal Trol-E-Duct for completely flexible lighting.

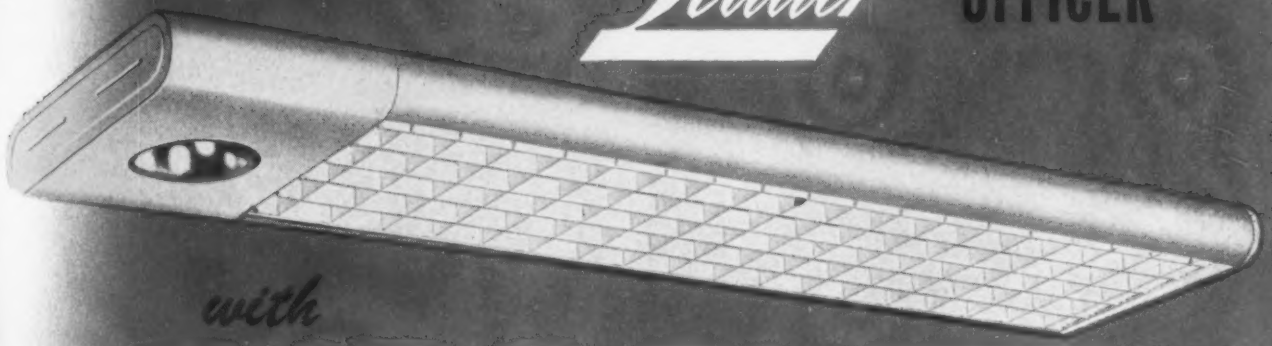
BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard Company
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

NOW THE *Leader* OFFICER



with

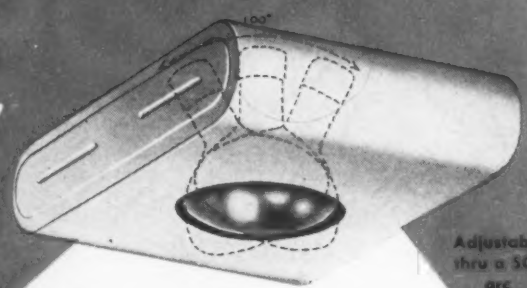
"DIRECLITE"

The most Outstanding Commercial Fixture

Plus . . . . MERCHANDISE

"Spot"

LIGHTING



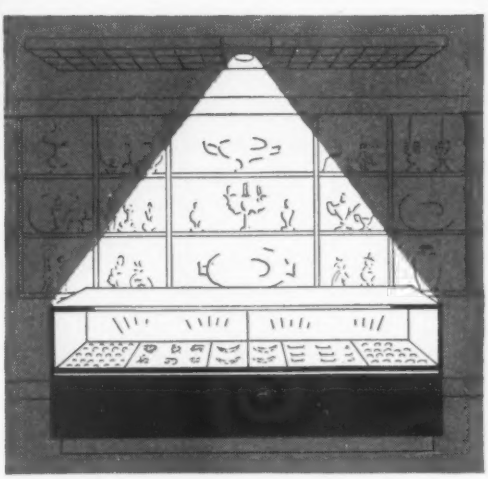
Leader Engineers now present the Direclite for spot lighting of merchandise. Direclite is easily attached at the end of a single unit or the center of a continuous run installation where any Leader Officer is used.

Thousands of installations have already proved the superiority of the Leader Officer Unit. Here is a fixture combining utility and high light output with beauty of design.

Now the Office Unit is available for additional merchandising uses, thus giving it extra merit to the high position it already enjoys.

Representatives in all principal cities.

Distributed only through the Better Electrical Wholesalers



THERE IS A LEADER REPRESENTATIVE IN YOUR AREA

Leader ELECTRIC MANUFACTURING CORP.

6127 NORTH BROADWAY • CHICAGO 40, ILLINOIS

WEST COAST FACTORY • 2040 LIVINGSTON STREET, OAKLAND 6, CALIF.

Self-selling FROM EVERY ANGLE

IN A PACKAGE AS GOOD AS THE PRODUCT!

We've taken a long stride forward in making it still easier for you to make money with SAMSON Automatic Irons! We've put each one in a handsome, colorful package that is an eye-catcher from every angle ... that tells the big features of the iron... that, on your counter, in your window, or even on your shelves, forms a *self-selling* display.

Remember, too, that the new SAMSON Automatic Irons have the same time-tested, sales-making features, plus even finer materials and construction than ever before.

Thus you will benefit from factors destined to increase still further the consumer acceptance Samson has established by providing appliances of distinction at popular prices.

SAMSON UNITED CORPORATION, ROCHESTER 10, N.Y.

Samson United of Canada, Limited, Toronto

ELECTRICAL SAMSON APPLIANCES

IN YOUR WINDOW...

ON YOUR COUNTER...

ON YOUR SHELVES...

ELECTRICAL WEST Sales Guide

NEWS LETTER FOR THE ELECTRICAL MERCHANT OF THE WEST

November
1 9 4 5
©

You'd like to know when you will get some merchandise. Don't blame you. Means whether you can stay going or not, perhaps. Here's the best we can find out through our Eastern men and our Washington office------

OPA determination to restrain prices at expense of dealer and distributor margins has manufacturers treed. Between OPA and strikes even the most hopeful are afraid to promise. OPA contends no selling will be necessary with such heavy public demand. This would mean lower costs, it says, so prices should stay put. Manufacturers earlier had considered some margin squeeze but abandoned that as unsound. Fearing quick change from sellers' to buyers' market they aren't eager to produce at increased labor cost under present ceiling prices. Production so far has no incentive back of it.

It's their own money, not Uncle's

So look for only a limited quantity and line until this is adjusted. Appliance distributors put up a strong protest to OPA recently against the price absorption policy. E.B.Ingraham, president, Times Appliance Co., New York, made the pitch, backed up by George Kindley, Edgar Morris Sales Co. Their plea, backed by facts and figures, showed OPA's policy would kill off small dealers first.

Yellow light, not green

Latest count indicated nearly 150 firms in consumer radio postwar, some 15 to 20 in southern California, four or five in northern California. Tubes are still the serious bottleneck and some sets may appear sans tubes during first year. Bendix radio has a plant in Pomona. Colonial, owned by Sylvania, has set up to produce private brand sets at a new Riverside factory. Remler intends to make sets in San Francisco. Hoffman in Los Angeles and Packard-Bell have already started.

Lots of radio

With RCA, Philco, Zenith accounting for 60% of normal business, G-E, Westinghouse, Bendix, Crosley, Emerson and others geared to to take 10% or more each, look for highly competitive fight, perhaps price war, not more than a year off.

Battle ahead?

Automatics! Not yet.

Don't expect many automatic washers soon, despite war's end and the dozen or so manufacturers who have announced models. Tooling up is costly, time consuming, difficult. Moreover most manufacturers will concentrate early distribution close to the plant to watch field tests and make servicing easier until all "bugs" are worked out. West Coast distribution on any proportionate scale may not occur until second year. Most guessers put 250,000 units as maximum first year production. Only Bendix, which has had experience and set up separate factory some time ago has models for dealer store display only as yet.

Pin-ups-- not girls, lamps.

Railley Corp., originator of the pin-up--- the lamp, not the girl-- is rolling them out again, says John Maddox, Western representative. It expects to bring out floor and table lamps soon too. Mitchell, of URC success in commercial and industrial fixtures, may bring out a line of table and floor lamps also.

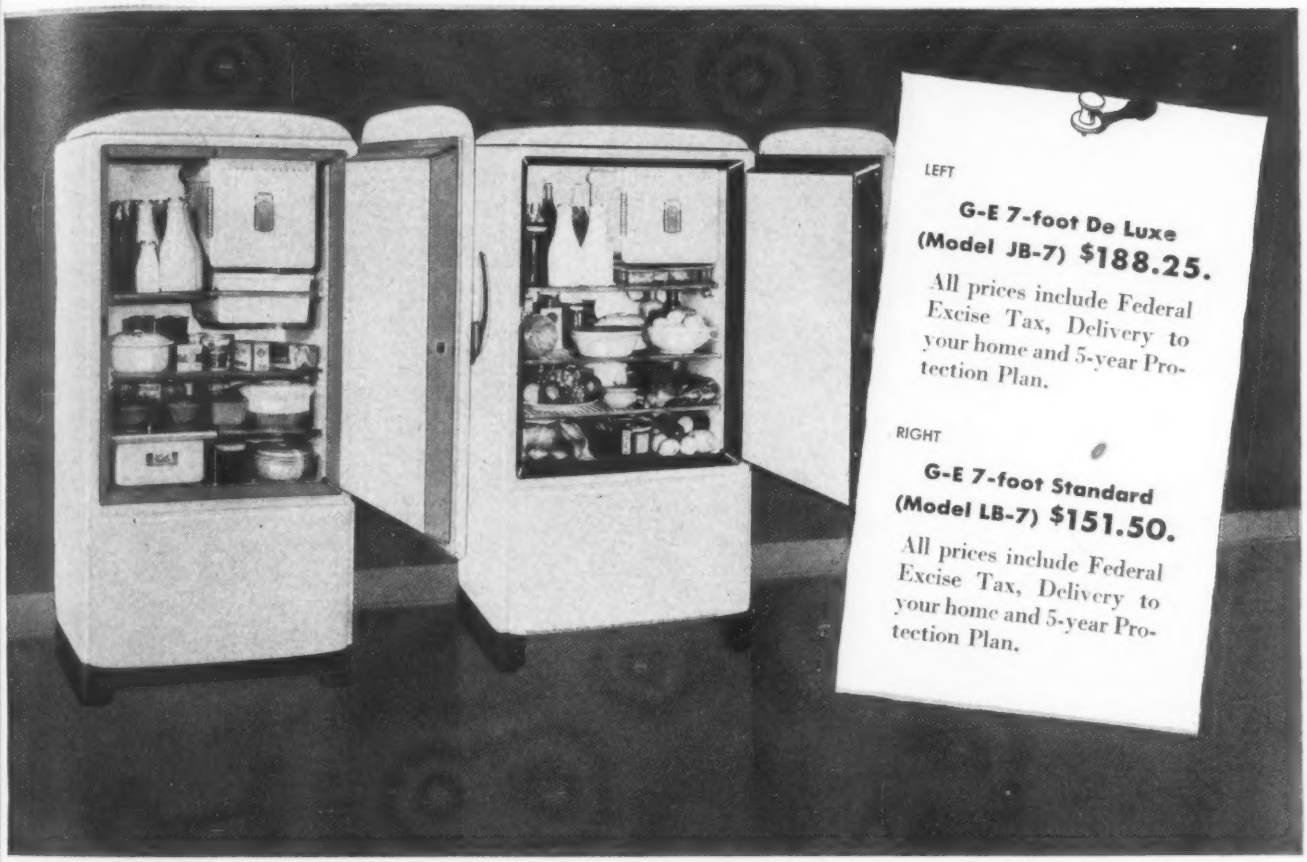
Only a trickle

Scattered items of table appliances, jobbers report to us, subject to strict allocation in very small lots, are arriving in the West, but much holiday business is apparently out this year. Of major appliances, refrigerators, ranges, washers are scheduled in that order, though November shipments were only expected to be in sample quantities. . . Only Frigidaire had a little stock in the West when the freeze was lifted . . Stromberg Carlson shipped samples of its first plastic table radios air express to distributors. . . Electromaster, according to Ben Sanderson, has samples of its ranges at its distributors, McCormack & Co. in northern, Sherman-Swenson in southern California. . . Toastmaster also has samples in each distributors' hands and as soon as stock is built up, shipments will go out about the same time to all. . . Maytag says each of its 7,000 dealers now has a sample. . . Menasco, an aircraft parts maker of Burbank has announced a new midget washer, priced about $30, weight 18 lb.; expects to have 10,000 ready for Christmas trade. . . Yale & Towne, old in hardware, new in appliances, will lead off with an automatic iron in its list of three appliances. . . Look for heavy emphasis on steam irons, plus dry automatics with "features". Most of the features may be held back until additional advertising and sales pressure is needed. . General Electric irons are rolling off the line at the Ontario, Calif. plant. . . General Aircraft Equipment is readying a refrigerator line, starting with commercial and home freezer units . . . Both gas and electric range groups are launching heavy promotion drives. Gas people are pointing at electrics, electrics at L.P. . . Viewtone's showing of $100-and-under television sets jumped the field in this price range. Most manufacturers sights were aimed higher. . . LaPoint Engineering is dickering with several appliance manufacturers on its new glass coffee maker.

New People

they're here!

THE G-E "PACEMAKERS" IN REFRIGERATION!


LEFT
G-E 7-foot De Luxe
(Model JB-7) $188.25.
All prices include Federal Excise Tax, Delivery to your home and 5-year Protection Plan.
RIGHT
G-E 7-foot Standard
(Model LB-7) $151.50.
All prices include Federal Excise Tax, Delivery to your home and 5-year Protection Plan.

Here they are—and the opportunity is ready and waiting to turn handsome sales profits *for you!*

The new, immediately available General Electric models now are off production lines—the 7-foot de luxe and the 7-foot standard—the models most eagerly sought today, as shown by exhaustive consumer surveys.

G-E for "Firsts"

Naturally *any* refrigerator line will sell just now. But isn't it wiser to make your best bid for the *future* as well . . . by handling, from this point on, the refrigerator line that's *best* for your business?

Remember— G-E was *first* to produce the all-steel (no wood parts) cabinet—finally adopted by the entire industry.

Remember— G-E was *first* to install the famous "sealed in steel" unit—later copied by others.

Remember— G-E's byword is *dependability* of performance year after year after year (over a million refrigerators in use 10 years or longer).

Remember— *Experienced* personnel plus *pioneering* in research—a G-E combination that has always meant the *best* in refrigeration *first.*

Let These Figures Point Up a Sales Moral for You

In producing refrigerators from 1927 to 1944, G-E reduced the unit weight from 202 lbs. to 62. It more than doubled refrigerating capacity. It more than halved current consumption. It increased the ice freezing rate by almost *5 times.*

Other Big Advances Just Around the Corner

And now—watch for *new* G-E models soon to be rolling to you. Models with ingenious new features and improvements. Models made *throughout* with G-E's customary care, skill, and precision. Models that simply can't help meaning spectacular sales for you! For it's only logical that since G-E makes "the refrigerators that *most* people want *most*" . . . then G-E is the refrigerator that *you* want to *sell* most!

GE Refrigerators

"THE REFRIGERATORS MOST PEOPLE WANT MOST"

GENERAL ELECTRIC

YOU GET ALL 5 WITH "UNITIZED"

- ★ Quicker ordering, manufacturing, shipment
- ★ Improved service continuity
- ★ Complete operating safety
- ★ Easy accessibility
- ★ Advanced manufacturing and design features

Pre-fitted Pre-wired Pre-tested

structurally—mechanically—electrically IMPROVED

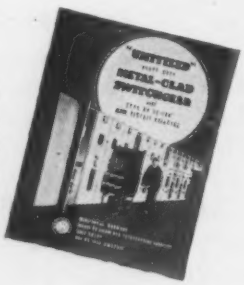
Start with the individual Bonderizing of the completed unit enclosures. Work your way inside to the "De-ion" breaker contacts—the "vitals" of Westinghouse "Unitized" Switchgear performance. Check every detail as you go and you will see why the advantages of "Unitized" Switchgear can't be packed into any one phrase.

Delays in switchgear installation and expenses of switchgear maintenance spring from a wide variety of conditions. To reduce or eliminate them, a wide variety of design and manufacturing improvements has been incorporated in our standardized drawings and manufacturing methods. Detailed information which you can obtain from your Westinghouse office will show you how completely we have done this.

J-60590

SEND FOR THIS BULLETIN

Booklet B-3036 illustrates and describes "Unitized" Switchgear for 2500 and 5000 volts; 600 to 2000 amperes; 100,000 to 250,000 kva interrupting capacity; draw-out air breakers. Write for it to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.



Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

1. Jig-welding assures interchangeability of basic units, holds outline and mounting dimensions to close tolerances.
2. Bonderizing of complete unit after welding protects against rust, improves appearance of finish.
3. All switchgear is thoroughly hand-finished in a large air-conditioned paint room before shipment.
4. All control devices are standardized and factory-tested. No interior wiring, or wiring of any kind is required.

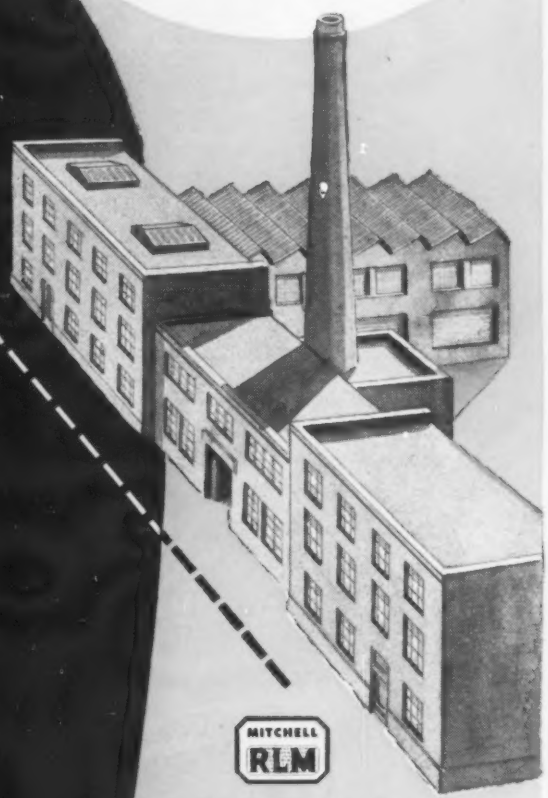
"UNITIZED" SWITCHGEAR

WESTINGHOUSE "UNITIZED" SWITCHGEAR IS AVAILABLE WITH AIR OR OIL BREAKERS TO MEET EVERY REQUIREMENT

Build a Successful Industrial Lighting Department

with

THE COMPLETE Mitchell LINE



Industry is lighting-conscious. Thousands of plants are a ready market for modern MITCHELL lighting. With the complete MITCHELL line, you can render a *thorough* lighting service . . . and *get the business*! Selling is easier because you bring your customers these positive benefits: (1) *Top lighting efficiency* (2) *Simpler installation* (3) *Lower-cost maintenance* (4) *Rugged durability* (5) *Wide choice of models*. Back of you at all times are MITCHELL resources, advanced engineering ideas, certified quality, and strong selling aids. All this gives you a definite edge on competition. All this helps you build a successful industrial lighting department.

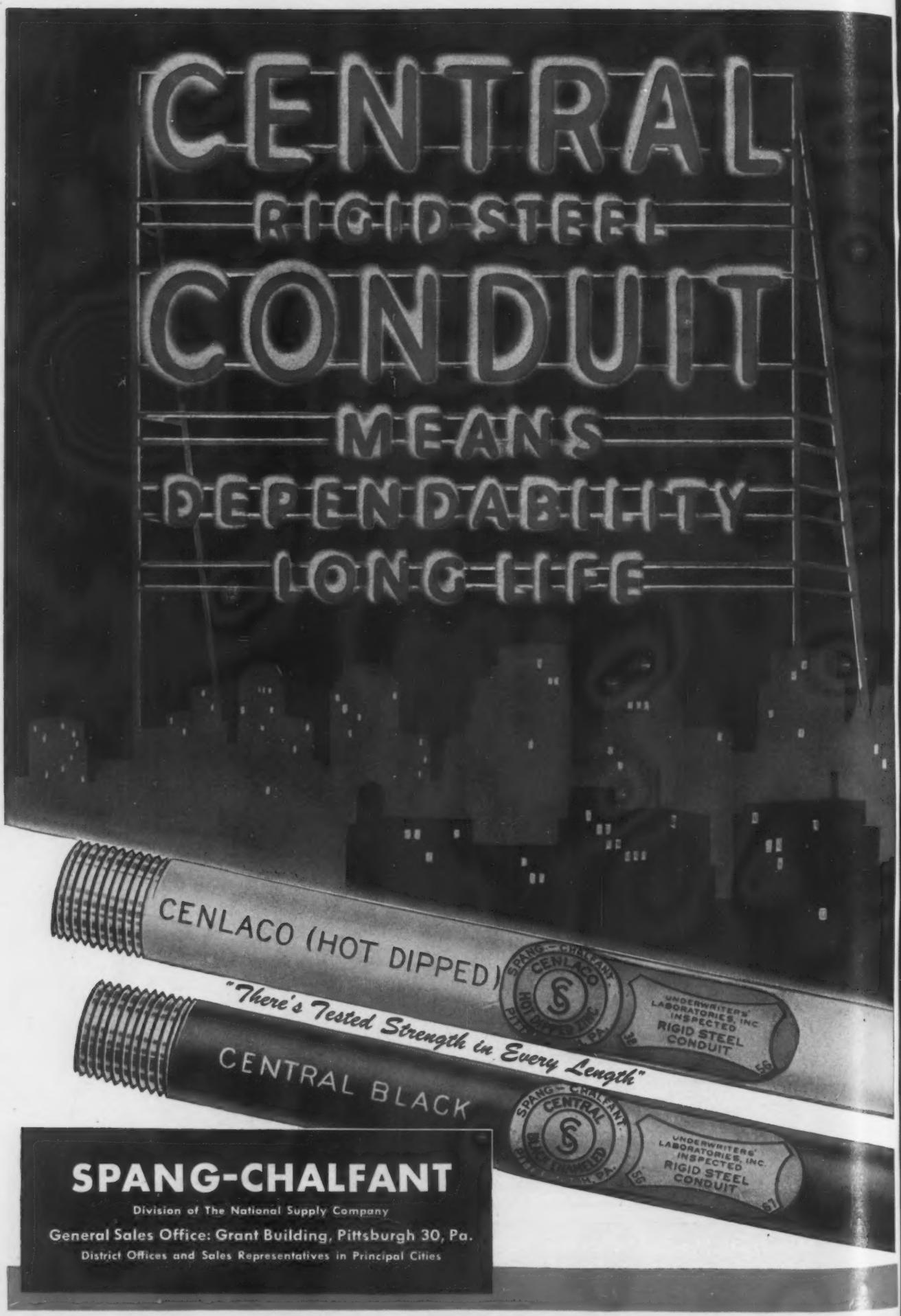
Makers of
Industrial and Commercial Fluorescent Lighting Equipment
Store Window Lighting • Spotlights and Floodlights
Desk Lamps • Portable Floor and Table Lamps
Bed Lamps • Ultraviolet and Infrared Health Lamps
Residential Lighting Specialties

MITCHELL RLM

Write for full-size Catalog No. 281 and pocket-size Catalog No. 290. Each tells full story of Industrial units . . . each builds sales.

Mitchell Manufacturing Company
2525 CLYBOURN AVENUE, CHICAGO 14, ILLINOIS
West Coast Factory and Sales Office: 1019 N. Madison Ave., Los Angeles 27, Cal.

MITCHELL
FOR TOP LIGHTING VALUE


CENTRAL
RIGID STEEL
CONDUIT
MEANS
DEPENDABILITY
LONG LIFE
CENLACO (HOT DIPPED)
SPANG-CHALFANT
CENLACO
UNDERWRITERS' LABORATORIES, INC. INSPECTED
RIGID STEEL CONDUIT
"There's Tested Strength in Every Length"
CENTRAL BLACK
SPANG-CHALFANT
CENTRAL
UNDERWRITERS' LABORATORIES, INC. INSPECTED
RIGID STEEL CONDUIT
SPANG-CHALFANT
Division of The National Supply Company
General Sales Office: Grant Building, Pittsburgh 30, Pa.
District Offices and Sales Representatives in Principal Cities

6 to 7 Carloads of BENDIX automatic Home Laundrys are going to BENDIX Dealers Daily

STANDARD MODEL

● They're calling it a reconversion miracle. Well, maybe it is. But miracle or no miracle, the fact stands out that Bendix has accomplished what it wanted to accomplish, by getting Bendix automatic Home Laundrys into its dealers' hands, *in quantity*, at the very earliest possible moment.

No dealer makes money on a factory's mere promises or good intentions. It's only when a job is *done* that his pay-off comes.

That's why it's important to remember that Bendix was *first* with a fully automatic electric "washer";

—that demand for the Bendix has pyramided into the greatest pent-up sales backlog ever accorded any electric "washer", anywhere, any time;

—that Bendix recently introduced another marvel in the Bendix automatic Home Ironer, which does a better job, on a greater variety of garments, and with more ease and simplicity for the operator, than any ironer ever before known.

And now—here's *more* history—in the fact that Bendix scores again in being "FUSTEST WITH THE MOSTEST."

BENDIX automatic Home Laundry

Bendix Home Appliances, Inc., South Bend, Ind. Pioneers and Perfectors of the automatic "Washer"

CHROMALOX Triangular Range Units for any make or size Electric Range

EASIER TO SERVICE—Any part, either of the two coils or the entire unit can be replaced in a jiffy. A screwdriver is all you need.

MORE PROFITABLE—Quicker servicing, smaller inventory and greater customer satisfaction mean more profit. Only two service sizes to stock. CHROMALOX Adaptor Rings insure perfect fit in any opening.

Write for details on CHROMALOX Triangular Unit and Catalog CF-145 describing complete line of CHROMALOX Range Units and Adaptor Rings.

CHROMALOX POINTS OF SUPERIORITY

- Ever-Level Cooking Surface
- Sheathed in "Inconel"
- Exclusive Surface Pattern
- Two Cooking Areas
- Easy to Clean

Fast Safe Low Cost

EDWIN L. WIEGAND COMPANY
7540 Thomas Boulevard Pittsburgh 8, Pa.

RC-10

on new ranges and for replacements

CHROMALOX

means "Electric Cooking at Its Best!"

PRODUCTS

that are news

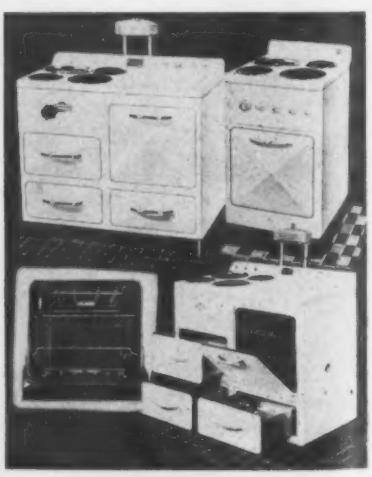
Electric Blanket (1100)

An electric blanket claimed to incorporate improvements resulting from experience with flying equipment, has been put into production by General Electric. One improvement is the use of a new long-life, single-strand, spiral-wound insulated wire, said to be more durable than the multi-stranded wire used previously and to permit elimination of the transformer required in the prewar blanket. The wire is inserted into channels woven in the fabric so that it is free floating and capable of resisting more than the normal amount of flexing or folding, it is stated. It will be available first in standard double-bed size and weight, in rose and blue. Blanket fabric is 50% woolen, 25% rayon and 25% cotton.

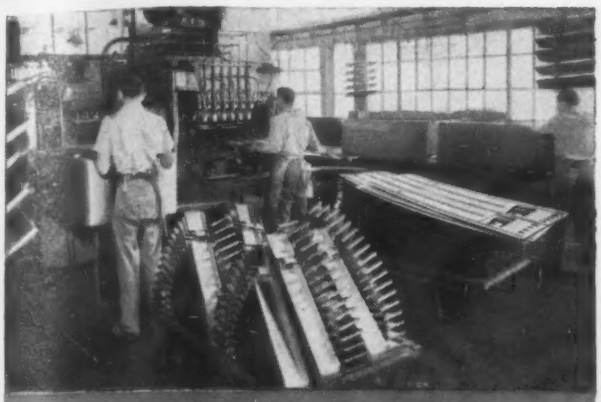
Vacuum Cleaners (1101)

Westinghouse recently announced that it had floor and hand vacuum models in production and expected to start manufacture of tank type units soon. Two new features have been added to the floor cleaner: Stepped wheels, which automatically adjust the distance from rug nap to cleaner nozzle and the "penetrator" brush which digs deeply in thick nap. The new models will also incorporate a "bifurcated" handle, consisting of two metal tubes attached to the cleaner's sides and joined near the top to form the grip, and a plastic motor housing. Tank type and hand cleaners will be the same as the 1941 models in design and construction, it was announced.

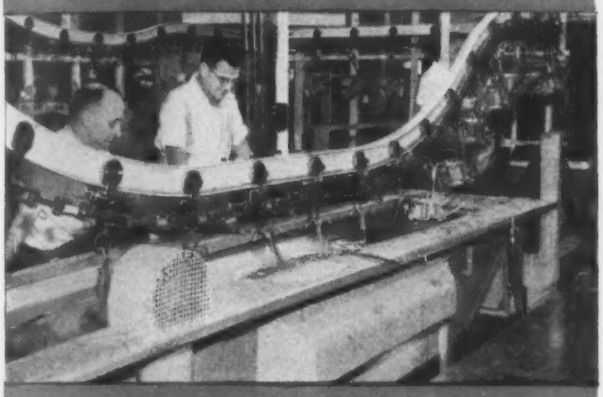
Ranges (1102)



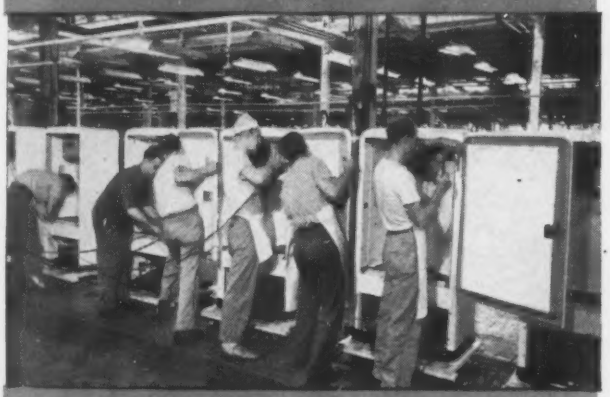
Electromaster is making two range models, the Banquet and Space-Saver. The former is a 40-in. range, with three surface units, each with five controlled heats, a deep well cooker, oven and warmer drawer. Features include convenience outlet, removable chrome vent grill, individual signal lights for surface units, oven and warmer, and a drip tray. The oven is illuminated by a recessed light in the side wall; the oven thermostat is automatic with a signal light to indicate when the oven is preheated to desired temperature. The Space-Saver model is similar but is two feet square.



1 **In Less Than 3 Minutes,** this machine makes 126 spot weld points, welding the back to another Frigidaire!



2 **Under-Water Test!** Meter-Misers, loaded for this test with high-pressure air, prove air-tight and leak-proof.



3 **Completed Refrigerators,** with Meter-Misers in place, coming down the production line toward final testing.

4 **Ready to Go** to Frigidaire dealers . . . then out to some of the millions of families that need new refrigerators.

5 **Electric Ranges,** entering this assembly line as empty shells, are completely finished products by the time they reach its end.

NOW ON THE WAY!

...Refrigerators and Ranges for Frigidaire Dealers

The pictures show, in part, how completely Frigidaire has reconverted to produce the refrigerators and ranges Frigidaire dealers need to take care of their customers.

But what these pictures cannot show is *how fast* these appliances are turned out. *How fast* Frigidaire changed over to peacetime production is better indicated by facts like these —

... Frigidaire's first "postwar" refrigerator came off the production line less than seven weeks after the official "go ahead."

... Within three weeks after the war ended, practically all the men and women taken off war contracts were called back to work on Frigidaire peacetime products.

Such speed of reconversion means more refrigerators, ranges and other products that will be reflected in the profit record of Frigidaire dealers.

Even more important, in the long run, such reconversion speed indicates Frigidaire's mastery of mass-production methods — manufacturing "know-how" which will continue to produce the *extra values* that mean *extra sales* for every Frigidaire dealer!

Look to Frigidaire for Leadership . . . through MANUFACTURING

For Excellence in War Production

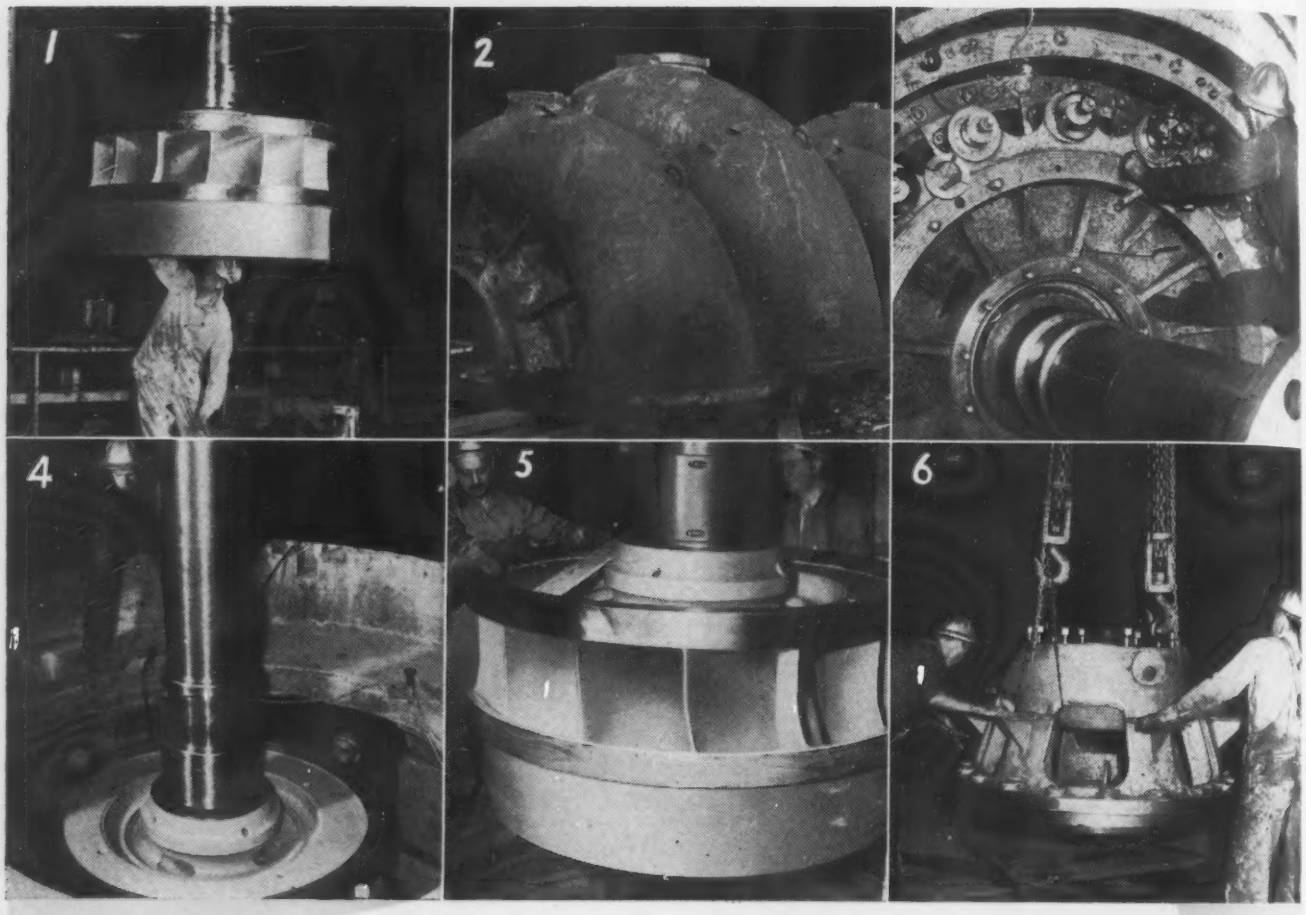
FRIGIDAIRE

Division of

GENERAL MOTORS

DAYTON 1, OHIO • LEASIDE 12, ONTARIO

REFRIGERATORS • RANGES • WATER HEATERS
HOME FREEZERS • ICE CREAM CABINETS
COMMERCIAL REFRIGERATION • AIR CONDITIONERS
BEVERAGE, MILK, AND WATER COOLERS



To Assure Reliable Service PELTON TURBINES are Installed by PELTON

● Installation views of one of two Pelton Reaction Turbines used for station service at the Grand Coulee Dam. 14,000 h.p., 400 r.p.m., 300 ft. effective head.

1. Turbine runner being painted.
2. Scroll cases for turbines.
3. With water wheel in place, the installation of the wicket gate is completed.
4. Runner being lowered in place.
5. Detail of turbine runner.
6. Bearing bracket which supports and encloses main turbine bearing is cleaned with air blast.

For sixty-five years, Pelton Turbines have been known throughout the world for their reliability and for their efficiency.

After precision construction in our own shops, Pelton Turbines are installed under the direct supervision of Pelton engineers who stay on the job during the entire installation and final testing.

That is additional Pelton assurance of utmost reliability when you select Pelton Turbines.

Pelton Reaction Turbines are made in a wide range of sizes up to 55,000 horsepower and more. Pelton Impulse Turbines are made from a fractional horsepower to 70,000 horsepower and more.

BLW THE BALDWIN GROUP

The PELTON WATER WHEEL Company

A Subsidiary of the Baldwin Locomotive Works

2929 NINETEENTH STREET · SAN FRANCISCO 10, CALIFORNIA

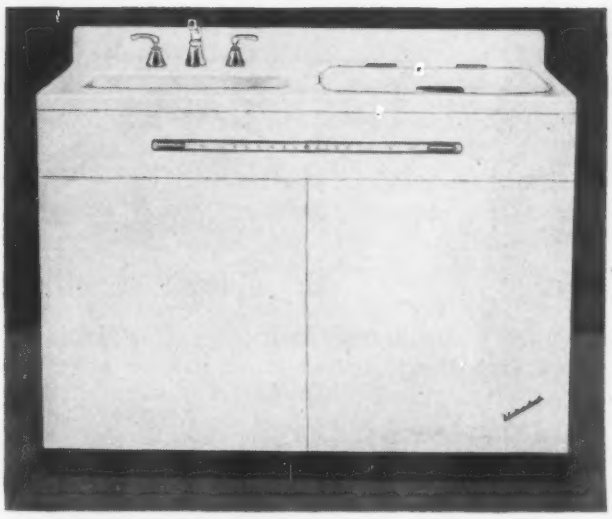
5 Reasons WHY THE G-E ELECTRIC SINK MEANS NEW BUSINESS FOR MAJOR APPLIANCE DEALERS

G-E Dishwasher and G-E Disposall (G-E Electric Sink) now Completely Automatic—slated to Attract New Market! Good news for your customers . . . the G-E Dishwasher washes and rinses a day's dishes in just a few minutes—*automatically!* Dishes dry in their own heat—cleaner, brighter than if washed by hand. G-E Disposall disposes of food waste electrically. Fits most any kitchen sink.

All New Merchandise! No Trade-ins! G-E Electric Sink being the youngest major appliance has the least saturation of any of them. It's a clean deal—no trade-ins to worry you. High unit sales and a real volume future.

Five Models Now Available! No prewar models. This is the line-up: (1) G-E Dishwasher and Disposall (G-E Electric Sink); (2) Sink with Dishwasher; (3) Free-standing Dishwasher; (4) Disposall for installation in present sink; (5) Dishwasher for installation in present work surface.

Saves More Work than Any Single Other Kitchen Appliance! Simplifies the housewife's day, does away with one of the most irritating of family "chores." Because the dishwashing—and drying—are *automatic* it saves time for other things.



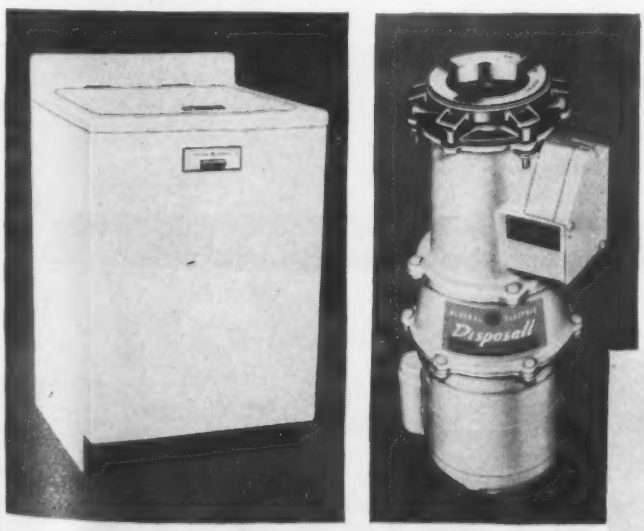
● ***G-E SINK*** **combines G-E Dishwasher and G-E Disposall**

Twelve times More Advertising and Promotion!

This great labor-saving unit is being backed with just about twelve times the promotion it had in prewar days.

Ads run in *Life, American Home, Better Homes & Gardens, House & Garden, Parents', Small Homes Guide.* Plugs on the famous G-E radio show, "The G-E House Party." The General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

Help Win the Peace—Buy and Hold Victory Bonds!



● ***LEFT:*** **G-E Free-standing Dishwasher**
● ***RIGHT:*** **G-E Disposall**

DISHWASHER AND DISPOSALL*

*REG. U. S. PAT. OFF.

The Complete Table-To-Shelf Dish Job Done Automatically

GENERAL ELECTRIC

"first—"

AGAIN, AS IN THE PAST, SIMPLEX COMES UP WITH ANOTHER *first* THIS TIME WITH FLAME - RESISTING TIREX PORTABLE CABLES.

ALL TIREX CABLES ARE NOW *Flame* RESISTING

In addition to the famous Selenium Rubber Armor which protects all Simplex-TIREX cables, flame-resistance has been added to the Selenium Rubber Armor with no reduction in its wearing quality.

TIREX SELENIUM Rubber Armor
Unequalled for Long Life Toughness and Resistance to Abrasion

When you need portable cables again, remember that Simplex-TIREX cables combine the latest advances in both manufacturing and technical skill.

THE BEST THINGS IN CABLE CONSTRUCTION COME FROM SIMPLEX FIRST

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

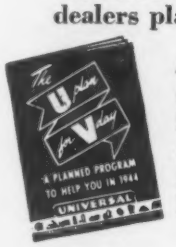
ARMY E NAVY

Simplex WIRES and CABLES

Dealers from coast to coast already have the correct answers to most of the vital present day problems. Two years ago, Universal began making tested marketing plans available to them at no cost. Now this foresight is ready to pay off. The industry is better prepared to compete for consumer dollars.

• • •

QUESTION: What did Universal do to help dealers plan for post-war?



ANSWER: In 1943 Universal presented a famous first, the "U" Plan for "V" Day—a comprehensive program aimed at getting purchasers' names on dealers' books. The plan has been copied from coast to coast.

QUESTION: How did Universal aid dealers to prepare their stores for better post-war merchandising?

ANSWER: Moderneering—the unique Guide to Store Planning—developed by Universal under the direction of Richard M. Bennett, Professor of Industrial Design, Yale University in cooperation with leaders in store modernization materials.

QUESTION: What big contribution is now being made to help all dealers do a better job of retailing?

ANSWER: The Universal Systemeering Program prepared under the direction of Dr. O. P. Robinson, Professor of Retailing, New York University in cooperation with experts in retailing brings dealers the latest scientific techniques.

QUESTION: What is Universal doing to pre-sell the public on its quality trademark and new products?

ANSWER: Throughout the war, Universal has maintained a substantial national advertising program calling for more full-page four-color advertisements than ever before in 15 leading national publications.

QUESTION: How about appliances and housewares?

ANSWER: Universal has spent over $4,000,000 to improve design, engineering and construction of appliances. Many products are already in production. Others will follow as soon as basic materials become available. Universal dealers can rest assured that merchandise will be shipped just as soon as possible.

See your nearest Universal Distributor for full franchise information.

UNIVERSAL
LANDERS, FRARY & CLARK • NEW BRITAIN, CONN.
Universal Electrical Appliances distributed in Canada exclusively by Northern Electric Company, Ltd.

Chief designer...

LOOKS like—yes, it is our old friend, Mrs. Home-maker! She's really the chief designer of Proctor appliances. Because we ask for her opinions regularly by questionnaire and spot survey. When the results are tabulated, only then do our nationally known engineers and designers go to work...to make her appliance dreams come true.

COMING!

...her greatest appliance creations!

After victory there'll be many newsmaking features, many surprise developments in Proctor Electric Appliances. Plan now to stock and sell 'em. Till then, keep on buying War Bonds.

PROCTOR

NEWSMAKER

IN APPLIANCE MERCHANDISING

PROCTOR ELECTRIC COMPANY—*DIVISION*, PROCTOR & SCHWARTZ, INC., PHILADELPHIA 40, PA.

Ranges (1103)

Landers, Frary & Clark will resume electric range production with three models, a deluxe, medium-priced and low-priced model. The Speedking, deluxe model, will have Universal's multi-heat control with individual signal lights for each surface unit, the light intensity increasing or decreasing as the unit speed is changed. A combination electric clock timer and minute minder is so connected that it may be used to control the oven and the built-in economy cooker or appliance outlet located on the back splash. The two-unit speed 16x16x19-in. oven is controlled by a combination oven switch and automatic preheat cut-off thermostat to automatically cut off the top unit when the oven has been set for preheat. Other features are an automatic oven light, a thermostatically controlled warming unit, utility drawers. Size of the unit is 40 in. wide, 26 in. deep.

The Super Clipper, medium-priced model, is similar but does not include the built-in control and timer, a feature which may be installed later if desired. The Super Planet, low-priced model, has single five-heat switches on the surface unit and oven control through selector switch and thermostat.

Home Radios (1104)

Nineteen styles of radio receivers are announced by Crosley Corp. for the first group of 1945-46 models to come off the production lines. The patented "floating jewel" tone system has been improved on the new combination radio-phonograph sets, according to the manufacturer, and a master tone control permits selection of 65 different tone combinations. The sets have built-in signal web antennae; all have both American broadcast and overseas short-wave bands, while four receivers have a third band for police calls. Styling has been improved, it is stated, and plastic is used more extensively in cabinets. Dials are of the full-view type. Eight of the 19 models are table sets, including two radio-phonograph combinations, one with automatic record changer, one with manual player; seven are console models, with five combination sets; four are battery sets.

NEW G-E PROMOTION PACKAGE

...to help you cash in on the G-E Home Laundry Line!

Yes sir—you're back in the home laundry business!

And General Electric is all out to help you make it the *biggest, most profitable* home laundry business in the history of appliances!

We've prepared a complete new G-E Promotion Package. Everything you'll need to get back in the home laundry business with a bang. Mammoth displays. Demonstration ideas. Direct mail.

And we're right there with up-to-the-minute advertising, too. All through the past years, we've been advertising in leading magazines and on the air, to the huge market that's waiting. (Results of 20 authoritative surveys recently compiled by G-E show 3,145,000 people want home laundry appliances.)

Now it's up to you to show 'em and tell 'em you have wonderful new General Electric Home Laundry equipment. Ask your G-E distributor for your back-in-business kit—today! It's well worth its nominal cost. General Electric Co., Appliance & Merchandise Dept., Bridgeport, Conn.

Here's what you get in this whopping-big G-E Self Starter Kit

2 window or store displays of Washer—actual size. (First one shown here.) Side cards featuring "G-E House Party" and laundry equipment • Store Merchandiser—one-sheet poster size (Handsome wooden frame, equipped with ads for merchandising) • Demonstration Kit • Dealer Mats • Direct mail folders on rotary ironers, flatplate ironers, dryers, full line • Booklets • Dealer catalog • Handbook pages • Vest pocket notebooks.

We're backing you up with sell-packed magazine ads!

Striking color pages, like this, run regularly in these magazines . . .

Collier's (reaching 2,799,664 people)
Parents' (reaching 772,632 parents of small children)
Woman's Home Companion (reaching 3,698,678 women)
Farm Journal (reaching 2,534,619 farm readers)

And a radio show that's a "pulleroo!"

It's "The G-E House Party"—a new daytime idea—packed with fun, games, and thrills. (Monday through Friday, 4 p. m., E.S.T., CBS.)

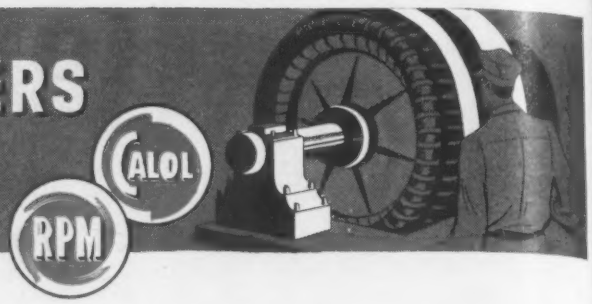
Art Linkletter as master of ceremonies has proved to be the hit of the daytime shows. Millions listen! A coast-to-coast audience, including *your customers*, who get entertainment, generously mixed with first-hand, up-to-the-minute information about G-E Home Laundry equipment.

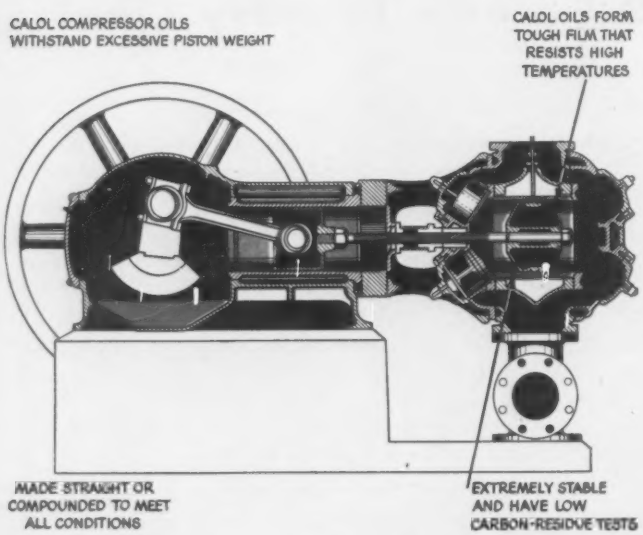
"THE APPLIANCES MOST WOMEN WANT MOST"

HELP WIN THE PEACE—BUY AND HOLD VICTORY BONDS

GENERAL ELECTRIC

STANDARD ENGINEERS NOTEBOOK




CALOL COMPRESSOR OILS WITHSTAND EXCESSIVE PISTON WEIGHT
CALOL OILS FORM TOUGH FILM THAT RESISTS HIGH TEMPERATURES
MADE STRAIGHT OR COMPOUNDED TO MEET ALL CONDITIONS
EXTREMELY STABLE AND HAVE LOW CARBON-RESIDUE TESTS

SINGLE-STAGE AIR COMPRESSOR WITH OIL-TIGHT CRANKCASE

Special oils up air compressor efficiency

Many operators have increased air delivery from compressors by lubricating cylinders with specially-made Calol Compressor Oils.

To meet both dry and moist operating conditions, in all type compressors there are two grades. Both withstand high pressures and temperatures.

Calol Compressor Oil—19 is a straight mineral oil. Pale in color, it is very stable and correctly lubricates under pressures up to 150 pounds per square inch.

Calol Compressor Oil—19X is compounded and completely resists the washing action of moist air on the cylinders of machines operating in humid surroundings. It is particularly adaptable to large horizontal compressors, where piston weight is a factor, and to compressors on air-injection Diesel engines.

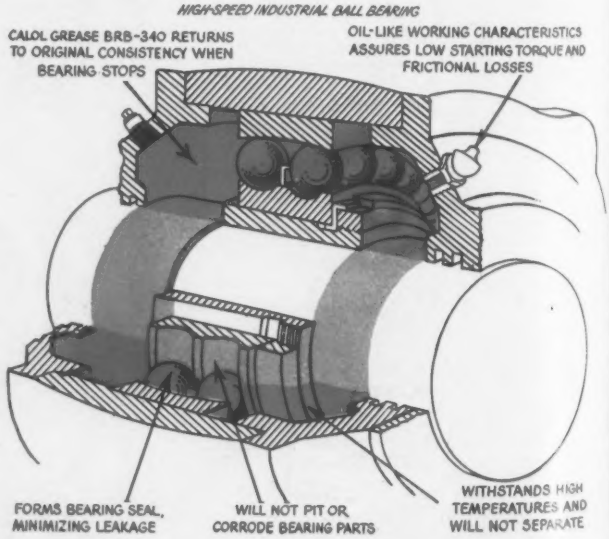
New Calol grease softens and resets

Where anti-friction bearings operate in severe conditions of temperature and speed, newly developed Calol Grease BRB-340 allows easy starting and reduces running friction to a minimum. At high shear rates, its apparent viscosity approaches that of its oil component. However, undue leakage from bearings is prevented by the peculiar ability of Calol Grease BRB-340 to reset, which causes the excess grease, swept aside by balls and rollers, to form a partial seal.

Calol Grease BRB-340 is soft, smooth and has a fine fibrous texture. It is milled by a special process that eliminates bleeding although it contains an unusual amount of oil stock.

When undergoing severe tests, Calol Grease BRB-340 showed no separation in a bearing operating 10,000 RPM at 200° F. for 528 hours. At the end of the test the bearing was in good condition.

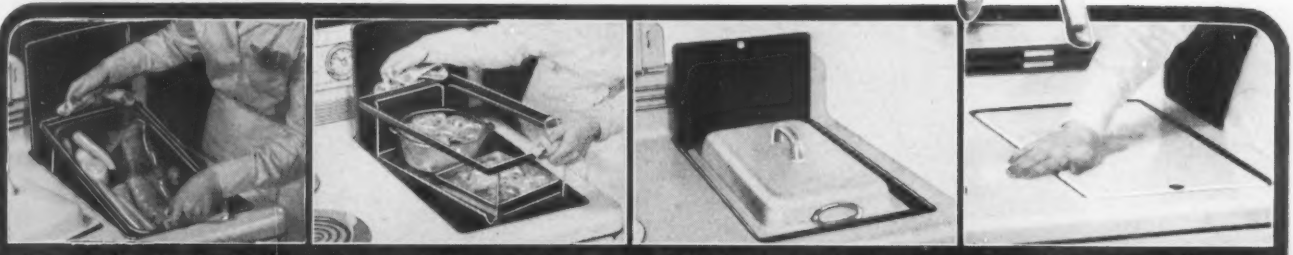
HIGH-SPEED INDUSTRIAL BALL BEARING


CALOL GREASE BRB-340 RETURNS TO ORIGINAL CONSISTENCY WHEN BEARING STOPS
OIL-LIKE WORKING CHARACTERISTICS ASSURES LOW STARTING TORQUE AND FRICTIONAL LOSSES
FORMS BEARING SEAL, MINIMIZING LEAKAGE
WILL NOT PIT OR CORRODE BEARING PARTS
WITHSTANDS HIGH TEMPERATURES AND WILL NOT SEPARATE

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your local Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

FOR EVERY JOB A **STANDARD OF CALIFORNIA** TEST-PROVED PRODUCT

She is the final authority



Large roasting compartment for complete meals, roasts, vegetables and potatoes.

Convenient lifter rack for casserole dishes and other small utensils.

High domed cover to increase depth of roaster for large fowl or whole ham.

Smooth flat top for working space when roaster is not in use.

ASK any housewife if she would like to have an electric roaster built right into the top of her electric range, where it is out of the way, yet always handy as an auxiliary oven. Ask ten housewifes. Ask a hundred. The more you ask, the more convincing will be your discovery that the Monarch Roaster Range packs the greatest consumer appeal of any electric range now appearing on the postwar market. There's a field-day ahead for Monarch dealers!

MALLEABLE IRON RANGE CO.
3915 Lake Street Beaver Dam, Wis.

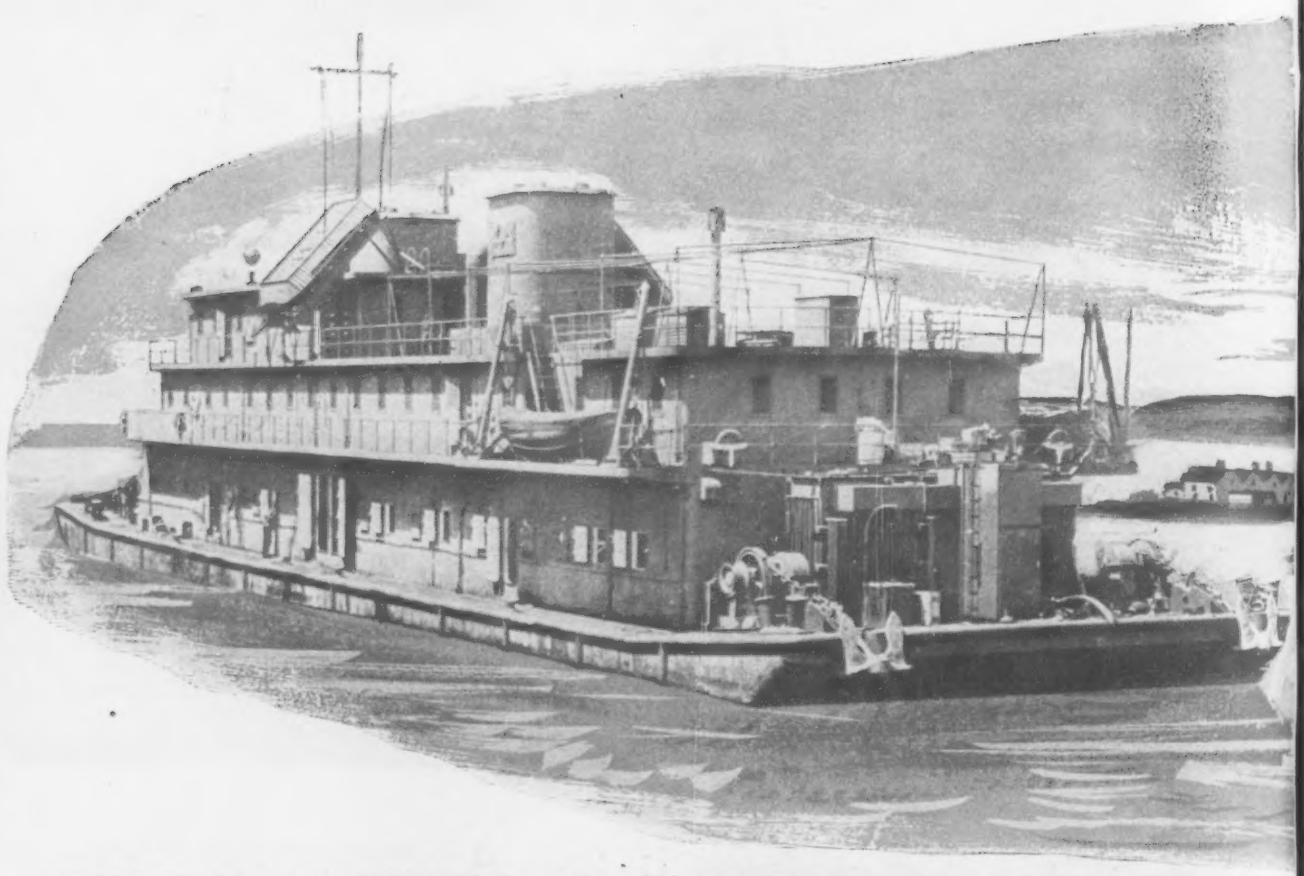
PATENTED

If it's a Roaster Range it's a MONARCH

Monarch-Paramount

COAL - WOOD, ELECTRIC, GAS and COMBINATION RANGES

floating power house



ANOTHER WESTINGHOUSE TRANSFORMER ACHIEVEMENT

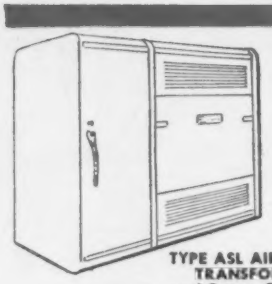
What's the quickest way to install a power station on a waterway or shore? Answer: float it there—already built!

That's the solution that Westinghouse engineers helped the Army to work out to provide large blocks of power quickly where needed on water fronts. Post-war, such floating powerhouses as the "Electra" may speed construction work or handling of ship cargoes.

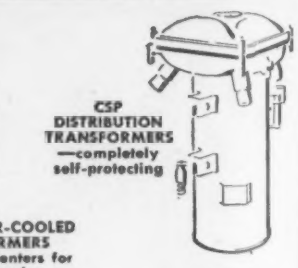
Solving the transformer problems involved in building a unit substation for this application is one of the more unusual problems that Westinghouse engineers have met. Many of the everyday problems encountered where transformers are used, have been solved equally successfully with Westinghouse developments.

Hipersil—the weight-reducing, high-permeability steel . . . loading-by-copper-temperature . . . complete self-protection . . . are all Westinghouse developments—available in *standard* Westinghouse transformers. Consult your Westinghouse representative or write today for full information on standard types of Westinghouse transformers available to meet your requirements—whatever they may be. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-70449

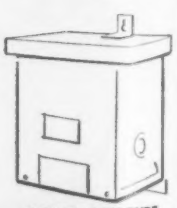


TYPE ASL AIR-COOLED TRANSFORMERS and Power Centers for indoor service



CSP DISTRIBUTION TRANSFORMERS —completely self-protecting

INSTRUMENT TRANSFORMERS —current and potential— indoor and outdoor— all ratings

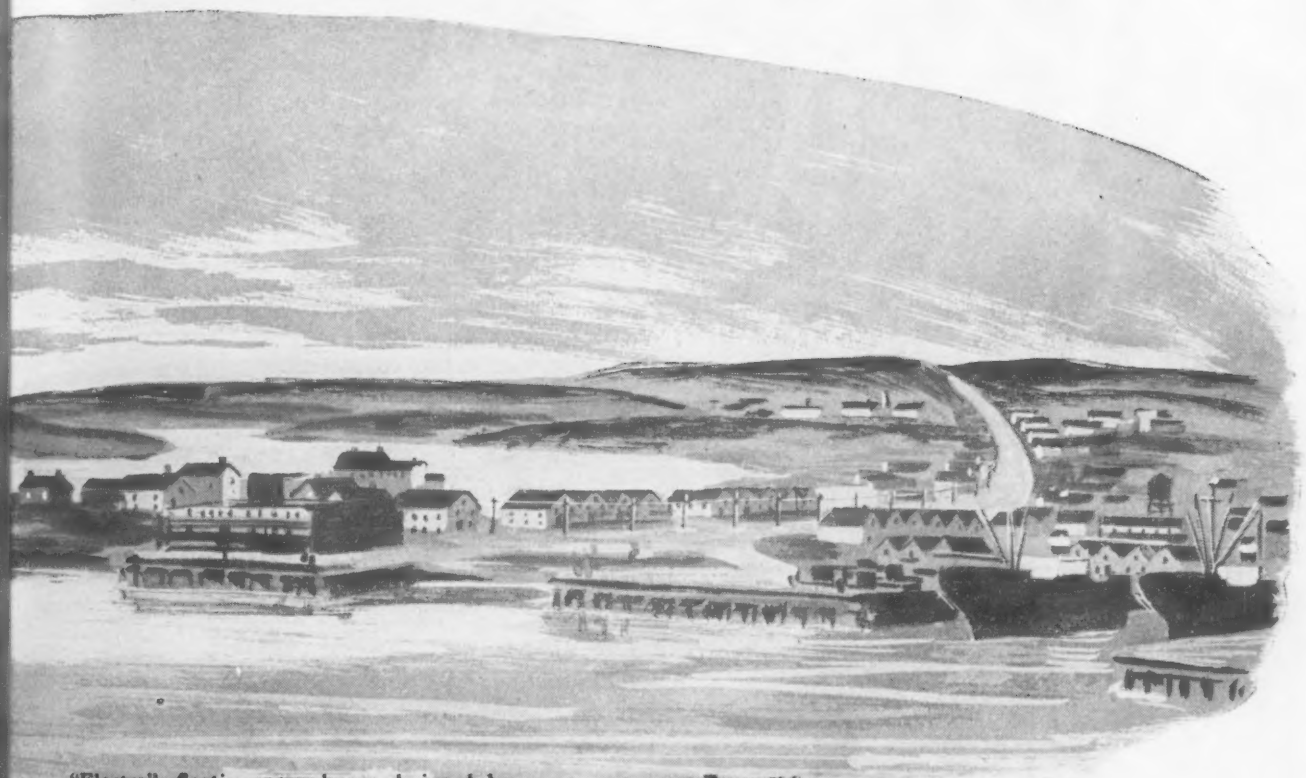


SMALL DRY-TYPE TRANSFORMERS for industrial power needs

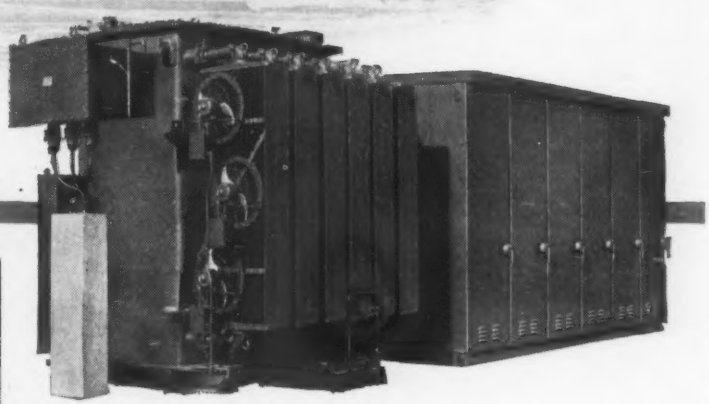
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

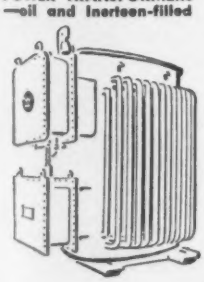
... FOR POWER-HUNGRY WATERFRONTS

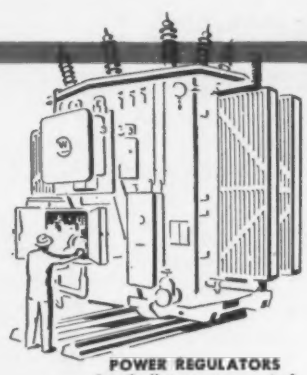


"Electra", floating powerhouse designed by Army engineers, includes eight 750-horsepower Westinghouse generators. Power is fed through Westinghouse unit switchgear to an outdoor-type substation—on the stern of the barge—with three Westinghouse 2,000-kva transformers.

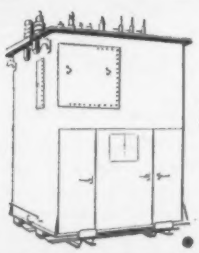


POWER TRANSFORMERS
—oil and Inerteen-filled





POWER REGULATORS
for tie-line power control



CSP POWER TRANSFORMERS
—a complete single feeder substation in one package

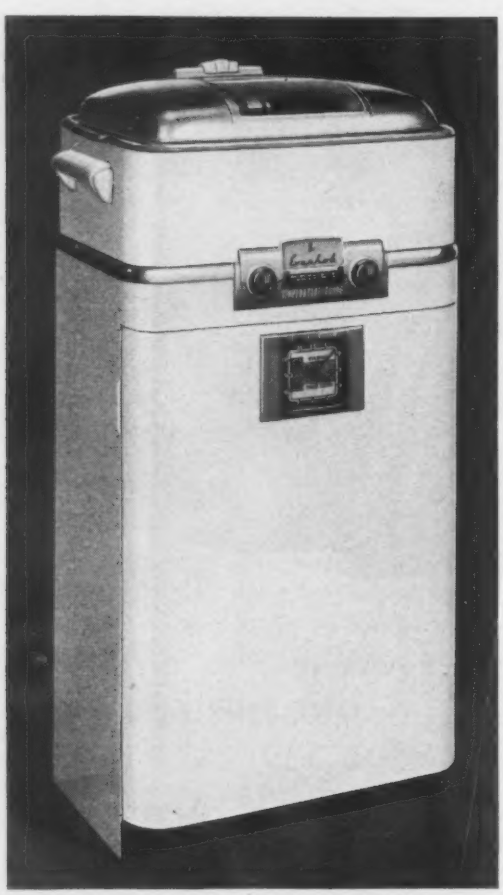
TWICE the Power in ONE-THIRD the space

Unit Substations perform all the functions . . . contain all the components . . . of conventional multi-feeder substations. In many cases they provide up to twice the capacity of conventional substations in as little as one-third the space. They eliminate the need of ordering, co-ordinating and installing a multiplicity of parts as separate items. Just ONE order—ONE delivery—ONE installation.

first name in **TRANSFORMER EQUIPMENT**

Post-War EVERHOT PRODUCTS

ROASTERS.. HEATERS.. APPLIANCES



● The new Everhot Roaster embodies all the thrilling newness and exciting advancements the public is expecting to find in post-war products. You have much of interest to talk about when you are showing this new Everhot . . . features never before incorporated in such an appliance.

Buy-Appeal Features

- Observation glass in lid.
- Combination in-built revolving temperature guide and cooking time-chart.
- New-type air and moisture control gives better flavor and appearance to all foods.
- Stain-proof cover.
- Turn-a-knob mechanical cover lifter.
- Deeper roasting pan assures more uniform cooking and better browning.
- Stainless steel covers for all utensils.
- In-built timer clock control optional.

Shipments Soon

THE SWARTZBAUGH MFG. COMPANY

Established in 1884 • Toledo 6, Ohio

AUTHORIZED WHOLESALERS IN ALL MARKETS

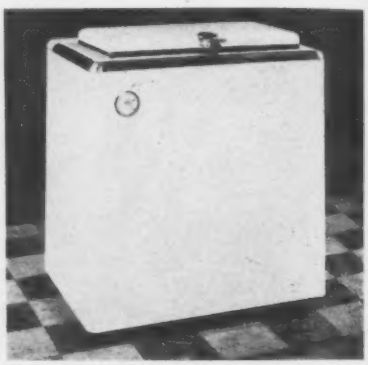
Kitchen Line (1105)

Frigidaire has announced production of its Model BI-17 electric range, and details of a home freezer model and a line of kitchen cabinet equipment to be marketed in its kitchen modernization program.

The new range takes a floor space 40 in. wide and 24½ in. deep; cooking top is 36 in. from the floor. It is equipped with a cooking top lamp, Radiantube cooking units, deepwell cooker, the "Even Heat" oven.

The freezer is a four-cubic-foot model, 36 in. high, 34½ in. long and 24 in. wide. Storage space is 12⅜ in. wide x 24⅝ in. long x 23 in. deep. The freezer weighs 250 lb. and includes the Meter-Miser unit. Present plans call for manufacture of an 8-cu.-ft. cabinet model, an upright model, with capacity of 5.1 cu. ft. and a "Super-Freeze" chest in the deluxe refrigerator.

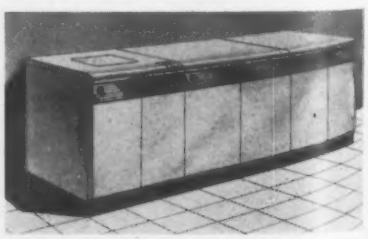
Cabinet equipment will include base, wall and utility cabinets and sink units of various sizes. They will be constructed of steel and finished in white baked enamel.



Combination Laundry (1106)

Blackstone Corp. will make a combination laundry to provide automatic washing, rinsing, drying and ironing in a unit 80 in. long and of standard counter height and depth.

The company has in production two washer models, the 130 deluxe wringer and the Model 132, both claimed to have design improvements. The former has an extra-capacity tub of triple-backed porcelain with splash-proof rim and the Hydractor three-way washing action. The latter has a family size tub, is equipped with the Hi-Vane aluminum circulator. Both models have Lovell wringers.



Pressed Globe (1107)

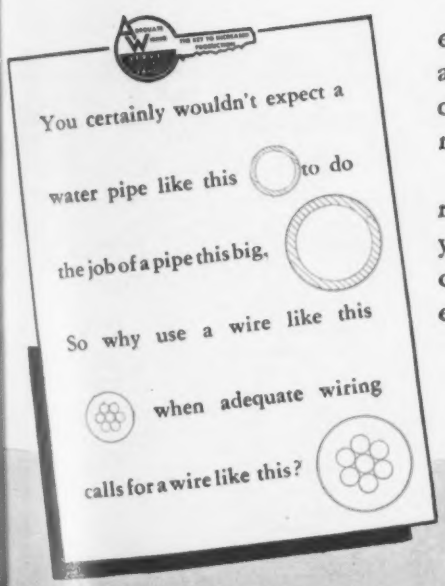
Designed to reduce maintenance expense and improve appearance, a new pressed globe for G-E Form 81 and 101 luminaires has been announced by the company. Shorter than those now used, the No. 232 globe is available in clear glass only. It can be used either with the present style Form 81 and 101 globe holders or with a newly designed holder similar to the detachable holder used with the Form 79 luminaires.

. . . but are you strangling Electricity?

You wouldn't strangle a water supply system by skimping on pipe size . . . reducing flow to a trickle. Yet, because of inadequate wiring practices, many electrical systems are being strangled thoughtlessly . . . throttling down the transmission of power for greater and more profitable work output.

Inadequacy may take one of several forms disastrous to maximum efficiency. Too few outlets, for example, are the obvious electrical equivalent of too few water faucets. Then too, insufficient copper in conductors can prove to be false economy not only in wattage lost but also in machines, appliances and lights functioning at less than peak efficiency.

To wire a new building adequately adds little to its original cost. To rewire a building that's electrically outmoded is an investment bound to yield immediate returns. In accomplishing either, an Okonite engineer can help you. Combine your experience with ours in the selection of electrical wires and cables. The Okonite Company, Passaic, New Jersey.


You certainly wouldn't expect a
water pipe like this
to do
the job of a pipe this big.
So why use a wire like this
when adequate wiring
calls for a wire like this?

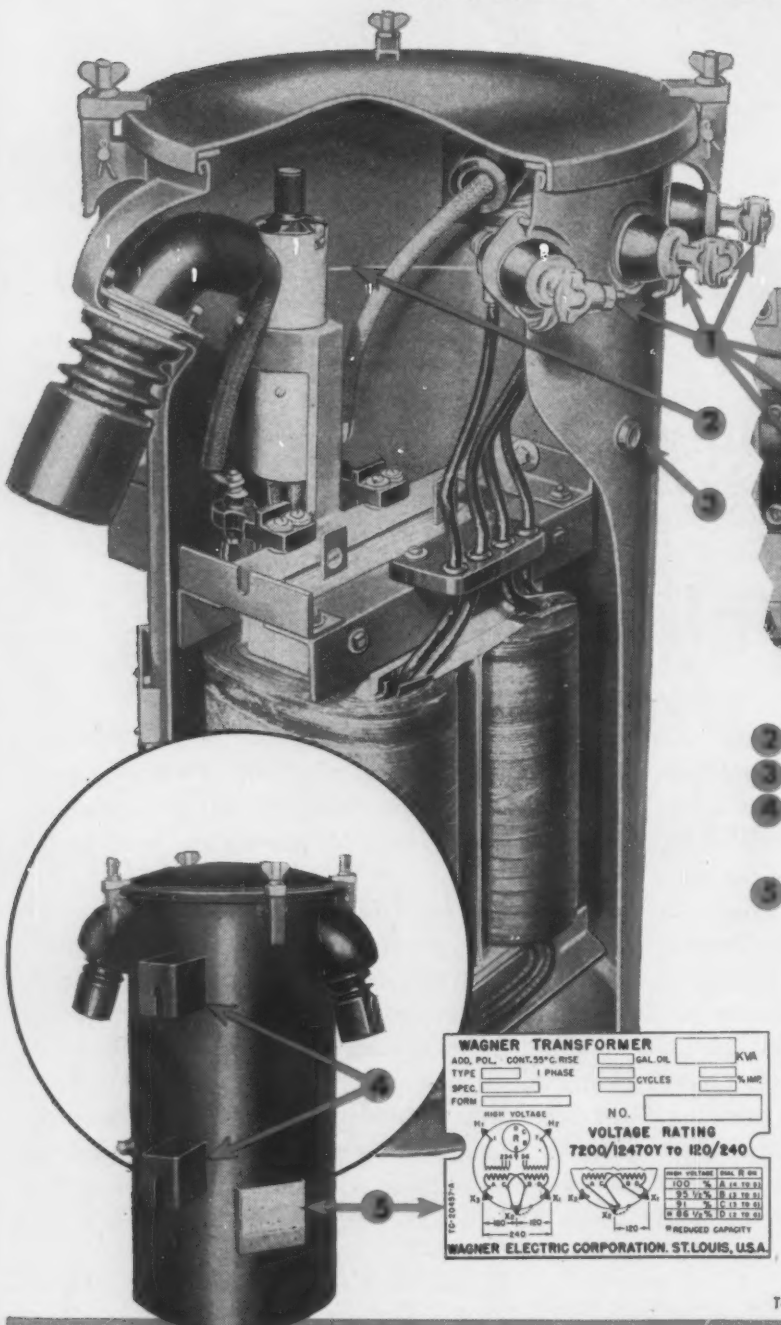
OKONITE

insulated wires and cables

4282

You get E. E. I.-NEMA Specifications in Wagner DISTRIBUTION TRANSFORMERS

—and here's what it means to you



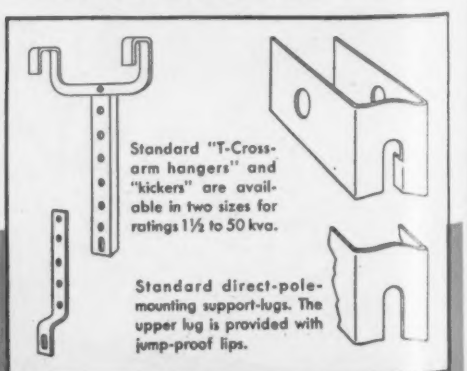
It means you get the benefit of the improved design, high quality construction, and high efficiency of Wagner transformers plus the following standardized mechanical features which mean ease of installation, and convenience in handling, operation, and maintenance.

1. Three low-voltage stud bushings of wet-process porcelain in standard locations. They are of the removable type and are provided with solderless connectors of standard size. Changing the low-voltage coil connections from series to parallel, or vice versa, is a simple matter because of the length of the leads and the convenient location and design of the terminals. Lock nuts are used to fasten the heavy lugs, on the ends of the leads, to the terminal studs.
2. Oil level is clearly indicated.
3. Provision is made for external grounding.
4. Support lugs for direct-pole-mounting are of heavy bar-iron, electrically welded to the tank and have standardized spacing for interchangeability.
5. Nameplate provided with connections shown and pad for user's data.

When required, provisions for external grounding links, terminal bushing caps, etc., have been established.

Complete Information on Request

WRITE FOR BULLETIN TU-51.



Standard "T-Cross-arm hangers" and "kickers" are available in two sizes for ratings 1½ to 50 kva.

Standard direct-pole-mounting support-lugs. The upper lug is provided with jump-proof lips.

Wagner Electric Corporation

ESTABLISHED 1891

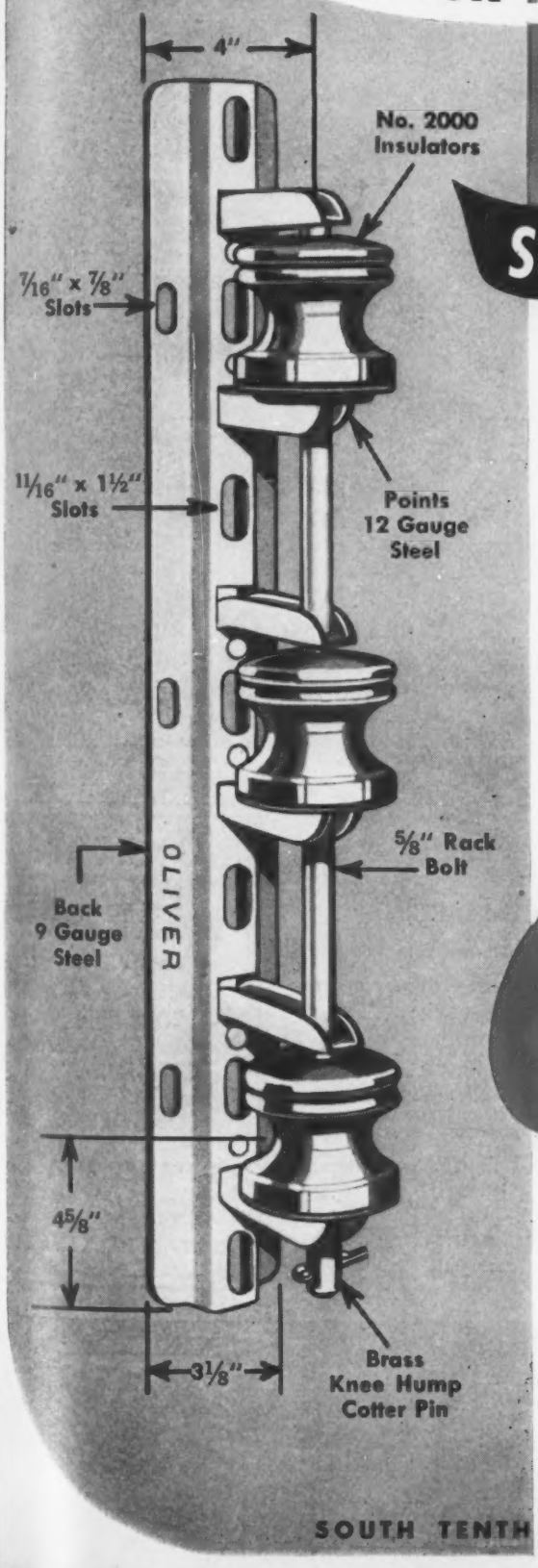
6381 Plymouth Avenue, St. Louis 14, Mo., U. S. A.

In Canada: Wagner Electric at Leaside, Ontario

ELECTRICAL AND AUTOMOTIVE PRODUCTS

FROM THE *Complete* LINE OF
OLIVER POLE LINE MATERIALS . . .

Oliver SECONDARY RACKS

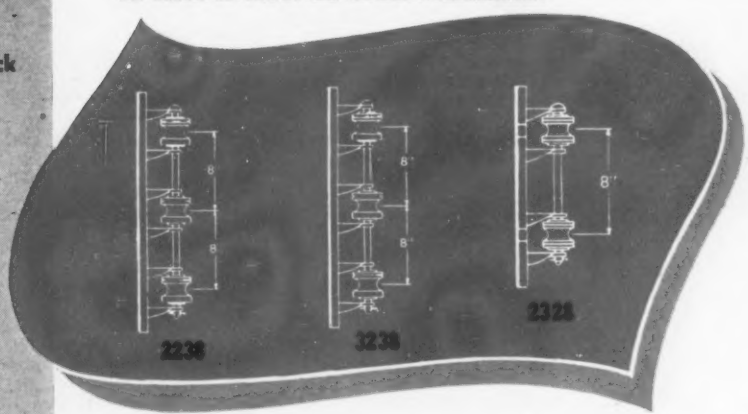


U-THROUGH STYLE IS STRONG, RIGID

A relatively new type of construction for Secondary Racks, the Oliver U-Through Style combines extra strength and rigidity with the other advantages of Oliver designs. Points are pressed in a U shape and firmly riveted in place through the panel, making a strong, dependable construction. All corners are well rounded to prevent injury to the line. The Oliver Hot Dip Galvanizing process insures adequate protection.

STYLES FOR ALL TYPES OF SERVICE

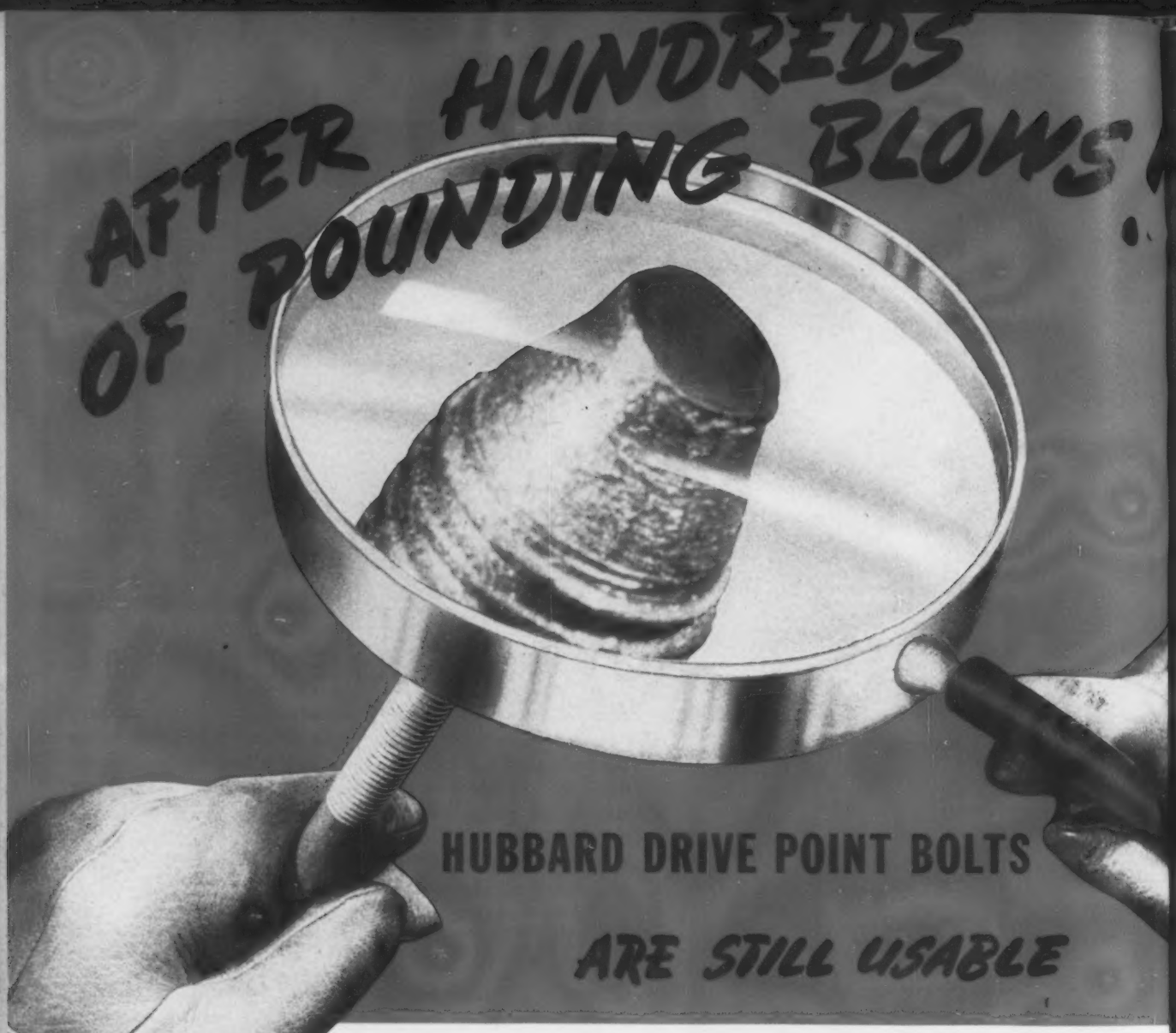
Oliver U-Through Secondary Racks are made in light and heavy types, with extended or non-extended back, in sizes to meet all usual conditions.



Our nearest representative will gladly give you full details about these and other Oliver Secondary Racks, as well as additional items of Oliver Pole Line Materials.

OLIVER
IRON AND STEEL
CORPORATION

SOUTH TENTH AND MURIEL STREETS · PITTSBURGH 3, PA.



CUTTING down waste of effort and time all along the line are two of the many important savings effected by Hubbard "Drive-Point" Bolts. Special TAPERED POINT permits the "Drive-Point" Bolt to be quickly inserted and removed from the hole with no lost motion. Linemen like them as they can start a nut on a "drive point" without removing their gloves. This is especially convenient when inserting a bolt at the top of a pole or other inaccessible place. The bolt can be easily removed without fear of battering the threads when it is necessary to hammer them out. To reduce installation, and maintenance costs and time to a minimum standardize on Hubbard "Drive-Point" Bolts, today . . . you'll find it will more than pay. Order from your nearest branch of General Electric Supply Corporation and Graybar Electric Company.

The HUBBARD "DRIVEPOINT"

is furnished on all bolts of the following types:

- ★ CROSS ARM BOLTS
- ★ CARRIAGE BOLTS
- ★ DOUBLE ARMING BOLTS
- ★ EYE BOLTS

HOT DIP GALVANIZED

HUBBARD

Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HUBBARD

HANG THE LOAD ON HUBBARD HARDWARE

The General Electric Lamp Department
invites you to attend the

Victory Lighting Jubilee

Premiere of 1946 Lighting

First Showing of Today's Lighting Fixtures and Portable Lamps for Homes, Stores and Factories. Exhibits by more than 150 Leading Manufacturers, under Sponsorship of the Lamp Department of General Electric Company.

NOVEMBER 26 THROUGH NOVEMBER 30

17th Regiment Armory, 34th St. and Park Ave., New York City

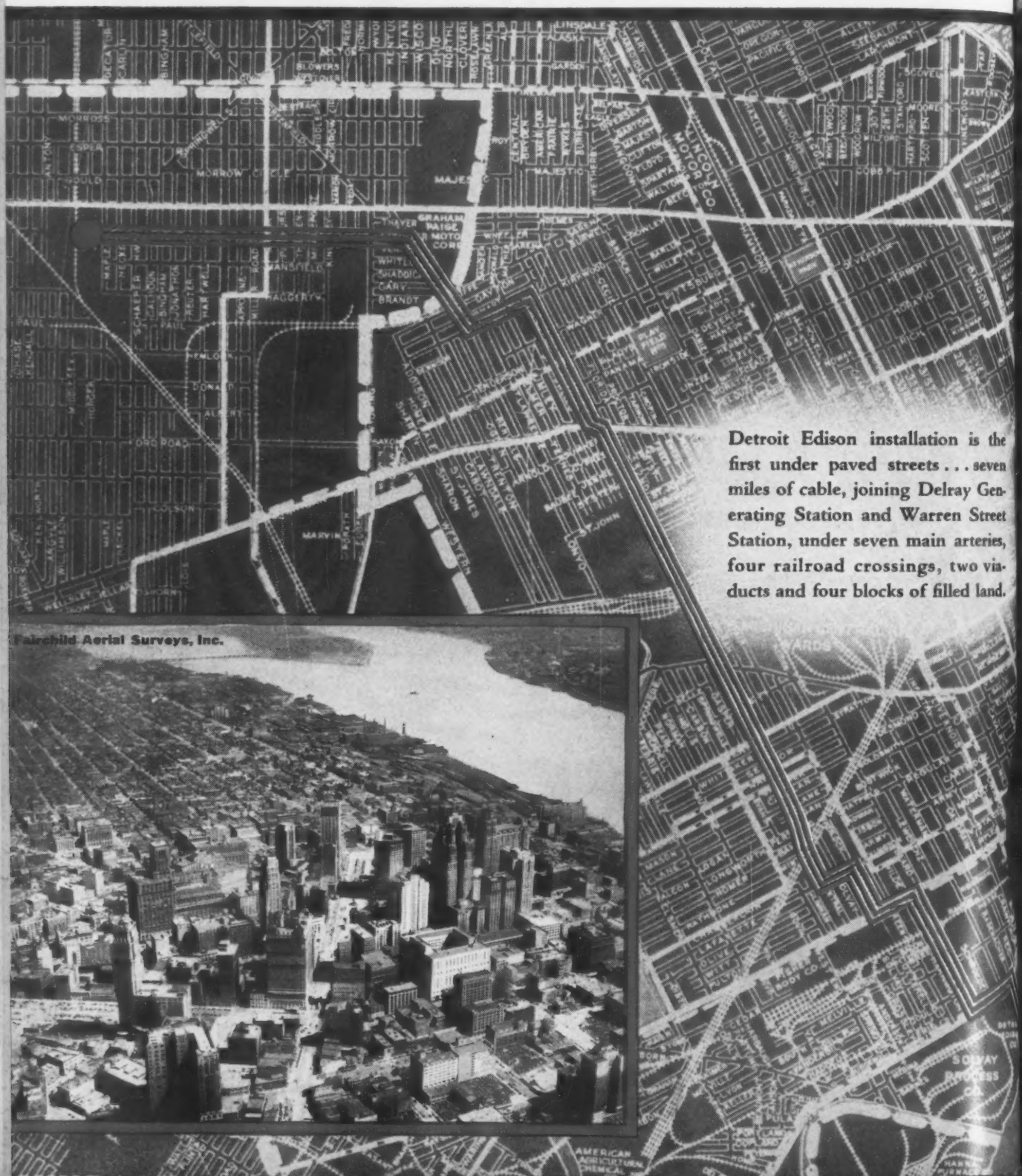
Here is your first opportunity to see a representative showing of the lighting fixtures and portable lamps that are being shown for 1946. Under the sponsorship of the G-E Lamp Department, outstanding manufacturers of lighting equipment will disclose the results of their work to date. Many manufacturers, for example, will show equipment for the new G-E SLIM-LINE and CIRCLINE Fluorescent Lamps, and for heat, drying, germicidal and sun lamps. For the first time you will be able to see all under one roof, how the lighting industry is developing new lamps, new materials and new designs for all markets — home, commercial and industrial. Another feature will be demonstrations of recent developments of General Electric Lamp Research.

The Victory Lighting Jubilee will be the most comprehensive exposition in the history of the lighting industry. It will bring the latest trends in lighting to department, furniture and chain store buyers, electrical wholesalers, electrical contractors, lighting companies, store owners, architects, builders, engineers, factory owners and executives, and similar groups. Plan now to attend!

G·E LAMPS

GENERAL ELECTRIC

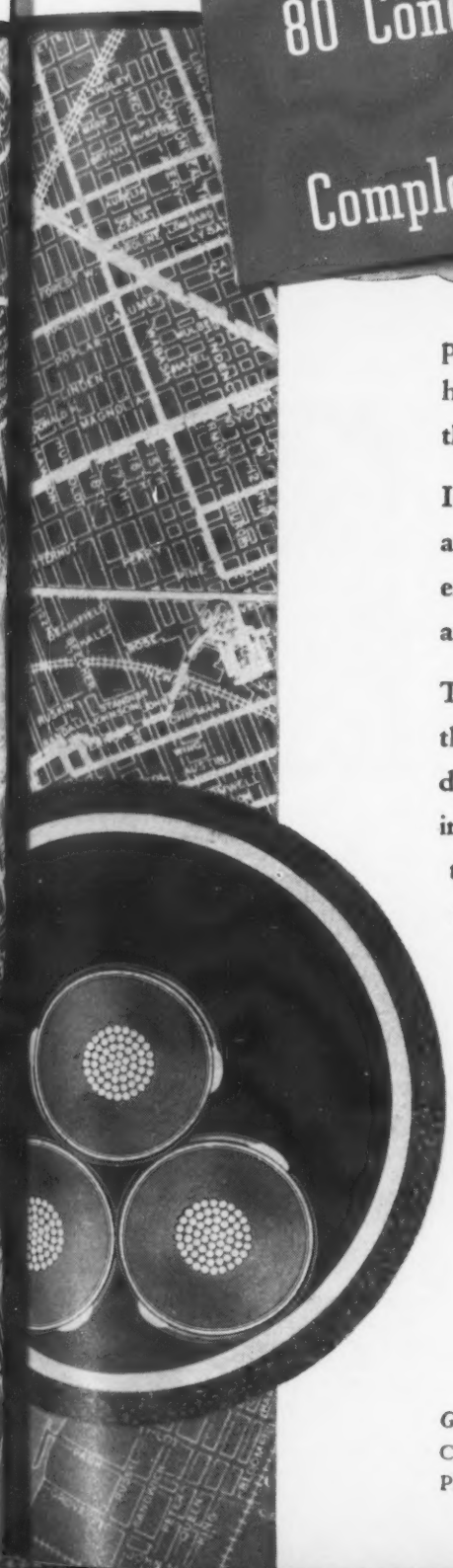
☆ THE WORLD'S FIRST
HIGH-PRESSURE, "GAS-FILLED C



Detroit Edison installation is the first under paved streets . . . seven miles of cable, joining Delray Generating Station and Warren Street Station, under seven main arteries, four railroad crossings, two viaducts and four blocks of filled land.

INSTALLATION OF PIPE-TYPE, CABLE"...

80 Conductor Mile-Years of Operation at 120 KV Completed without a Service Failure



After careful consideration of six competitive cables, Detroit Edison engineers four years ago selected high-pressure, gas-filled cable in steel pipes as most suitable for the underground transmission of 95,000 kv-a.

It was chosen, after thoroughly investigating the relative dielectric and impulse strengths, ionization and power factors, thermal properties, installation problems, cable movement, operating experience, and comparative costs of the six competitive cables.

The design of High-Pressure Gas-Filled cable is based on the fact that the dielectric strength increases with increase of pressure and decrease of paper tape thickness. This principle is met by insulating the conductors with thin tapes in the high stress region near the conductor and by maintaining these conductors under a nitrogen gas pressure of 200 psi after installation in the steel pipe.

General Cable engineers will be glad to acquaint you further with the pipe-type, high-pressure, gas-filled cable.

GENERAL CABLE
CORPORATION

General Cable Corporation Sales Offices are located at Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Kansas City (Mo.), Los Angeles, New York, Philadelphia, Pittsburgh, Rome (N.Y.), St. Louis, San Francisco, Seattle, Washington (D. C.)

Cole Electric Co.

1510 South Los Angeles Street
PRospect 2068
LOS ANGELES 15, CALIFORNIA

•

POWER PLANT EQUIPMENT

AIR BREAK SWITCHES
MANUALLY OPERATED

AIR BREAK SWITCHES
MOTOR OPERATED

DISCONNECTING SWITCHES

BUS AND CABLE FITTINGS

BUS AND CABLE SUPPORTS

FUSE MOUNTINGS

FUSES

SWITCHBOARDS

INDUCTION RELAYS

MARINE EQUIPMENT

SWITCHBOARDS

ELECTRICAL EQUIPMENT RELAYS

AIRPLANE EQUIPMENT

BOMB RACKS

SWITCH HOUSINGS

THROTTLE SWITCHES

LIMIT SWITCHES

OIL FILLED SWITCH HOUSINGS

SWITCHBOARDS

RELAYS

•

Pacific Coast Representatives

EICHER & BRATT
Colman Bldg., Seattle 4, Washington • • Eliot 2722

EARL S. CONDON COMPANY
357 S. Hill St., Los Angeles 13, Calif. • • MI. 2831

Portable Washer (1108)

A portable washer called the Electro-Mite is being manufactured by the Menasco Mfg. Co. The unit consists of three pieces: Electric motor base; wash tub, 12 in. in diameter and 17 in. high, and a lid. The tub contains no working parts, oscillation being from the motor base. If desired, the tub can be lifted off the base and used on the stove for sterilizing clothes. Tub capacity is 4½ gal. Sample loads are four men's shirts; 12 pieces of ladies' lingerie; four bath towels; eight face towels.

Washer, Spinner Unit (1109)

Easy is making a portable washer called the Whirldry, which washes, rinses and spins clothes damp-dry. This white porcelain enamel unit is 18 in. high, 16 in. wide; weighs 33 lb. It was designed for small washes, baby clothes, etc.

Split-Second Starter (1110)

A new split-second starter, the "Jack Rabbit," has been developed by General Electric for fluorescent lamps. For use with the G-E 40-watt instant-starting lamps, the new starter is the product of five years of research, and the manufacturer claims that the "Jack Rabbit," used with conventional ballast, provides approximately 13% greater operating efficiency than high-voltage instant-starting ballast systems. The starter is designed to fit conventional sockets and should be used with instant starting lamps. It is somewhat larger than standard starters, measuring about 2¾ in. long, 2½ in. deep and 1 in. wide. It is white and harmonizes with the Twin Turret lampholder in design. When used with standard sockets, these devices should be located in the fixtures to provide clearance for the starter. The "Jack Rabbit" can be used for replacement in existing fixtures that have proper clearance for its dimensions. The new unit gives a choice of three variations of starting for one fixture, being in addition to the FS-4 and FS-40.

ELECTRIC HOME HEATING

Perfected Here in the West

Don't think we are saying we did it! The "state of the art"—as patent lawyers say—had to be right, for home heating by wire to be perfected.

Here in the West, conditions are right. Hydro-electric power, renewed each year by mountain snow and rainfall, gives us abundant low-cost electricity. Many of our homebuilders are sufficiently adult to know that a comfortable home—winter and summer—needs insulation as much as does an electric refrigerator or water heater.

Building on those priceless advantages, with over a quarter-century of specialized experience—

WESIX Auto-matic *Wired heat*

has achieved a final perfection of home heating that is *unknown anywhere else*. For example, Wesix has many performance records of homes heated an entire year with fully-automatic electric heat for only $6.00 to $10.00 per year per room! Two of the world's large electrical manufacturers have recently sent their top-notch experts West to study Wesix achievements in electric home heating. The Wesix line has grown to include a wide range of capacities from small portable heaters to complete electric heating systems for homes or larger buildings.

DEALERS?
Place orders now with your jobber for your first quarter 1946 requirements.

If you are NOT yet informed on today's amazing perfection in electric home heating, you owe it to yourself to investigate. Our new informative booklet (for homeowners) and specification literature will be mailed to you, at your request.

WESIX ELECTRIC HEATER CO.

390 FIRST ST., SAN FRANCISCO 5, CAL.

Which Strand would YOU rather work with?

If you want to hear a lineman really moan, give him some strand that's stiff, hard to shape, and just plain cantankerous.

But watch what happens when he works with Bethlehem strand. He finds that it readily sets to shape, that it's uniform, easy to handle. The second reel is just as good as the first. And the third is just as good as the second. Crankiness simply doesn't exist in Bethlehem strand. Naturally, the stronger grades are stiffer than those of lower strength, but in every case Bethlehem gives you the *maximum* in flexibility.

This isn't a matter of "happenstance." It's achieved in the Bethlehem mills through a system of rigid controls, up-to-the-minute chemistry, expert metallurgy, and the finest wire-drawing technique. These factors, combined with the latest advances in stranding methods, assure you of a product that is uniform in quality—uniform in handleability—always easy to work with.

Bethlehem strand is available in all standard grades, and every foot of it is armored by a bethanized coating of A, B, or C weight to protect against corrosion.

BETHLEHEM STEEL COMPANY—on the Pacific Coast

Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Salt Lake City; *Steel Plants:* South San Francisco, Los Angeles, Seattle; *Fabricating Works:* South San Francisco, Alameda, Los Angeles; *Shipyards:* San Francisco, Alameda, San Pedro.

BETHLEHEM BETHANIZED STRAND

ENGINEERED THROUGHOUT FOR FOUR-WHEEL-DRIVE

Wherever there's a tough job of pole-setting or other construction or maintenance work . . . whenever line-trouble "pops", anywhere, far off the highway over rugged terrain or in muck . . . you can depend on FWDs to get men and equipment through to do the work.

Heavy-duty engineering for true four-wheel-drive throughout every inch of FWDs is what gives them the stamina and reserve power to cope successfully with the wide range of utility requirements.

Maximum power drive, equally distributed to all four wheels through FWD center differential . . . balanced weight distribution on all four wheels that assures positive traction and reduces driving-strain on axles . . . and other performance-proved features of FWD engineering make these, the original four-wheel-drive trucks, first choice of hundreds of utilities, many of whom operate big FWD fleets. Write for the Utility Bulletin.

THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wisconsin
Canadian Factory: Kitchener, Ont.

FWD TRUCKS

THE ORIGINAL EXCLUSIVE BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS

F W D Distributors

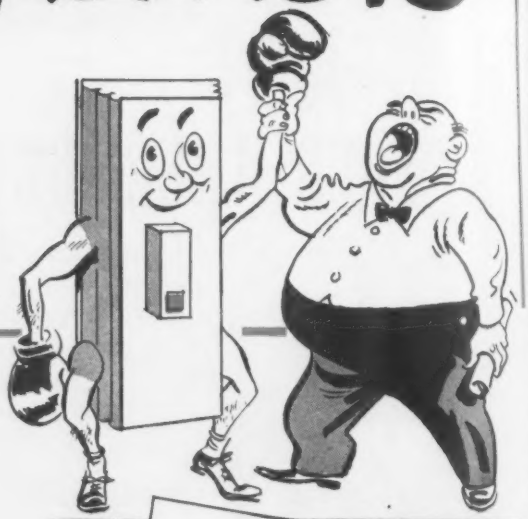
ARIZONA—Arizona-Cedar Rapids Co., 401 N. 1st St., Phoenix, Ariz.; CALIFORNIA—The Four Wheel Drive Auto Co., 1337-39 Santa Fe Avenue, Los Angeles 21, Calif., and FWD Pacific Co., 469 Bryant St., San Francisco 7, Calif.; COLORADO—Liberty Trucks & Parts Co., P. O. Box 1889, Denver 1, Colo.; IDAHO—Intermountain Equipment Company, Broadway at Myrtle St., Boise, Idaho; MONTANA—Steffeck Equipment Co., 11 E. Cutler St., Helena, Mont.; NEVADA—Allied Equipment Co., Reno, Nevada; NEW MEXICO—The Myers Company, Las Cruces, N.M.

F W D Distributors

OKLAHOMA—Halliburton Oil Well Cementing Co., P. O. Drawer 471, Duncan, Okla., and Oklahoma Road Mach. Co., Muskogee, Okla.; OREGON—Feenaughty Machinery Co., 112 S.E. Belmont St., Portland 14, Ore.; UTAH—Cate Equipment Co., 49 E. 9th St. So., Salt Lake City, Utah; WASHINGTON—Feenaughty Machinery Co., 1028 6th Ave., So., Seattle 2, Wash., and Feenaughty Machinery Co., 715 N. Division St., Spokane, Wash.; WYOMING—Wortham Machinery Co., 517 W. 17th St., Cheyenne, Wyo.

CERTIFIED BALLASTS

. . winner over tough prospects!



THE more exacting the fluorescent lighting buyer, the more you'll congratulate yourself on equipping your fixtures with Certified Ballasts.

Because on tough-to-close deals, and on any deal, the prestige and the quality assurance of the Certified label weighs in with extra wallop.

And here's why Certified Ballasts bring your fixtures extra selling power:

1. **Certified Ballasts** are built to definite specifications . . . to assure better lamp performance. *Leading fluorescent tube makers recognize this*—since they guarantee lamp performance in Certified Ballast-equipped fixtures.
2. **They're Certified by Electrical Testing** Laboratories, Inc., as meeting these specifications, after exhaustive testing; and subject to regular re-checks by ETL.
3. **Certified Ballasts** are a reassuring mark of top quality fixture dependability and performance, of long-lasting satisfaction . . . *and your customers know it!*

It's a lot easier to sell Fluorescent fixtures *with* Certified Ballasts than without them. Why not let their sales appeal work for *you?*

Certified Ballast

Manufacturers

MAKERS OF BALLASTS FOR CERTIFIED FLUORESCENT LIGHTING FIXTURES

CHICAGO TRANSFORMER CORP.
3501 Addison St., Chicago, Illinois

DONGAN ELECTRIC MFG. CO.
2987-3001 Franklin St., Detroit, Mich.

GENERAL ELECTRIC CO.
Specialty Transformer Section
1635 Broadway, Fort Wayne, Ind.

JEFFERSON ELECTRIC CO.
Bellwood, Illinois

SOLA ELECTRIC CO.
2525 Clybourn Ave., Chicago 14, Illinois

WHEELER INSULATED WIRE CO.
378 Washington Ave.,
Bridgeport, Conn.

INSTALL UNDERFLOOR WIRING FOR UTMOST ELECTRICAL ADEQUACY

G-E Q-FLOOR WIRING
For Robertson Q-Floors

G-E FIBERDUCT for Concrete and Wood Floors

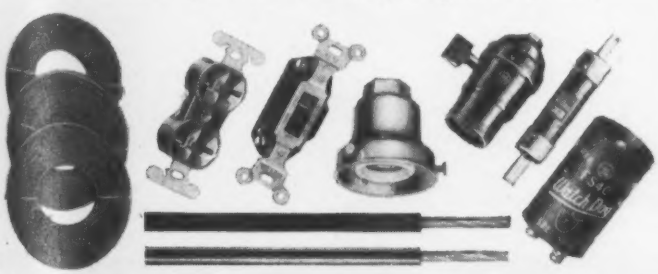
YOU can provide great electrical adequacy in the buildings you wire by installing one or the other of General Electric's underfloor wiring systems. G-E Fiberduct underfloor raceways are ideal for use with concrete or wood floors, G-E Q-Floor Wiring for use with Robertson cellular steel Q-Floors. Use this underfloor wiring in factories, office buildings, stores, hospitals, schools, etc.

Your customers will like the electrical flexibility these underfloor wiring systems give the buildings in which they are used. Electrical outlets can be preset or added later when they are needed. Factory machines, office appliances, store displays, etc. can be changed at will with assurance that power will be available for them in the new locations.

FOR FURTHER INFORMATION on G-E Fiberduct underfloor raceways or G-E Q-Floor Wiring or on G-E Wires and Cables or G-E Wiring Devices, see the nearest G-E Merchandise Distributor or mail the coupon.

G-E BUILDING WIRES AND WIRING DEVICES

G-E building wires and wiring devices will meet every requirement. In the G-E line are Types T and TW small diameter building wire, other building wires and hundreds of wiring devices including switches, outlets, lampholders, fuses, etc.



General Electric Co.
Section CDW-1154-18
Appliance and Merchandise Dept.
Bridgeport, Conn.

Sirs: Please send me: ☐ G-E Fiberduct catalog; ☐ G-E Q-Floor Wiring catalog; ☐ Information on G-E Wires and Cables and Wiring Devices.

Name.....

Address.....

City..... State.....

GENERAL ELECTRIC

Sangamo METERS ARE ON THE

Sangamo Meter Assembly Line showing beginning of Type J Meter assembly.

SANGAMO ELECTRIC

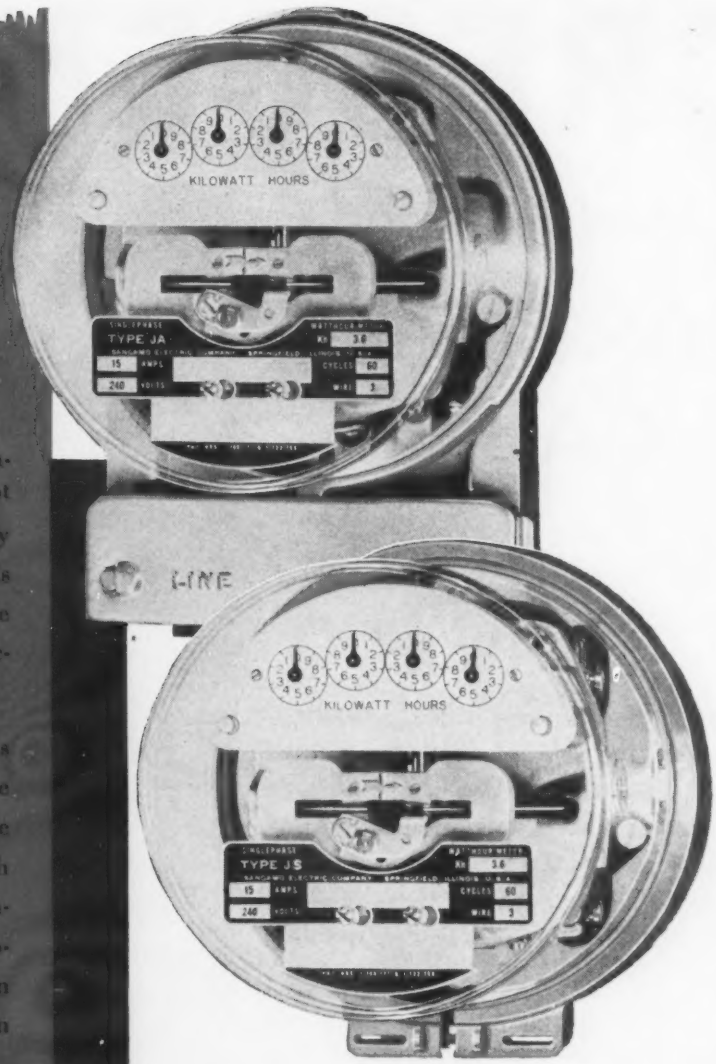
ESTABLISHED 1898 • • • • • WATT HOUR METERS

ASSEMBLY LINE

Similar to many other industrial and commercial products, watthour meters are not yet available in the quantities in which they are needed. The accumulation of orders is mounting to a backlog which could not be filled immediately even by pre-war production levels.

The meter industry is fully aware of its responsibility in providing an adequate supply of meters. Sangamo Meters are on the assembly line. The same organization which won five Army-Navy "E" citations is concentrating all its efforts on increasing the production of watthour meters. This production has been stepped-up greatly—it will soon reach pre-war quantity levels.

At present, in spite of all production efforts, deliveries of domestic meters have not caught up with today's meter requirements. With a little patience, this shortcoming will be corrected and Sangamo Meters will again be available on normal, pre-war delivery schedules.



Available in either "A" or "S" mountings. Type J Meters are designed for indoor and outdoor service. Ability to measure accurately loads ranging from a small percentage to 400 per cent of the meter's normal full load rating, is an inherent characteristic of the Type J Meter.

NO OTHER COMMODITY IS MEASURED SO *Accurately* AS ELECTRIC POWER

•

COMPANY SPRINGFIELD ILLINOIS

• • DEMAND METERS • • • • • TIME SWITCHES

CRESCENT

Steel-Armored

PARKWAY CABLE

for direct earth installation

The easing of Government restrictions on the use of lead for cable sheathing makes CRESCENT Parkway Cable again available in all voltage ranges from 600 to 5,000 volts with rubber insulation, and 600 to 15,000 volts with Varnished Cambric insulation.

●

The two layers of Flat Steel Tape Armor which protect the lead sheath, afford maximum protection and long life. When buried in the earth no additional protection is needed.

●

These cables are extensively used for underground street lighting circuits, railroad yard lighting, signal and control circuits, airport power and lighting circuits, and in industrial plants and mines.

●

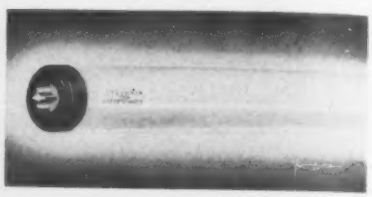
Type RLJFJ is shown here. All other standard types can also be furnished.

CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

CRESCENT WIRE & CABLE

Cold-Cathode Lamp (1111)

Sylvania has added a cold-cathode K lamp to its fluorescent line. Available early next year, this lamp will be instant starting and will have a rated life of 10,000 hours. It is claimed that on and off frequency will have no appreciable affect on life. It will be made in both 72- and 96-in. lengths of T8 (1 in.) diameter and will come first in standard white color, with soft white, daylight and other colors to be added later. It will operate on a standard 120-ma. multiple ballast. Lampholders will be available as accessory equipment and will permit operation of the K lamps in multiple. The lamp base employs a special contact pin, which fits into a lampholder punched with a hole of similar design, a variation made to prevent the LS type fluorescent from being inserted in a circuit designed for the K lamp, as the two have different starting and operating characteristics. Lampholders for higher voltage, where lamps are used in series, are being developed, it is stated.



Splatter-Proof Heat Lamp (1112)

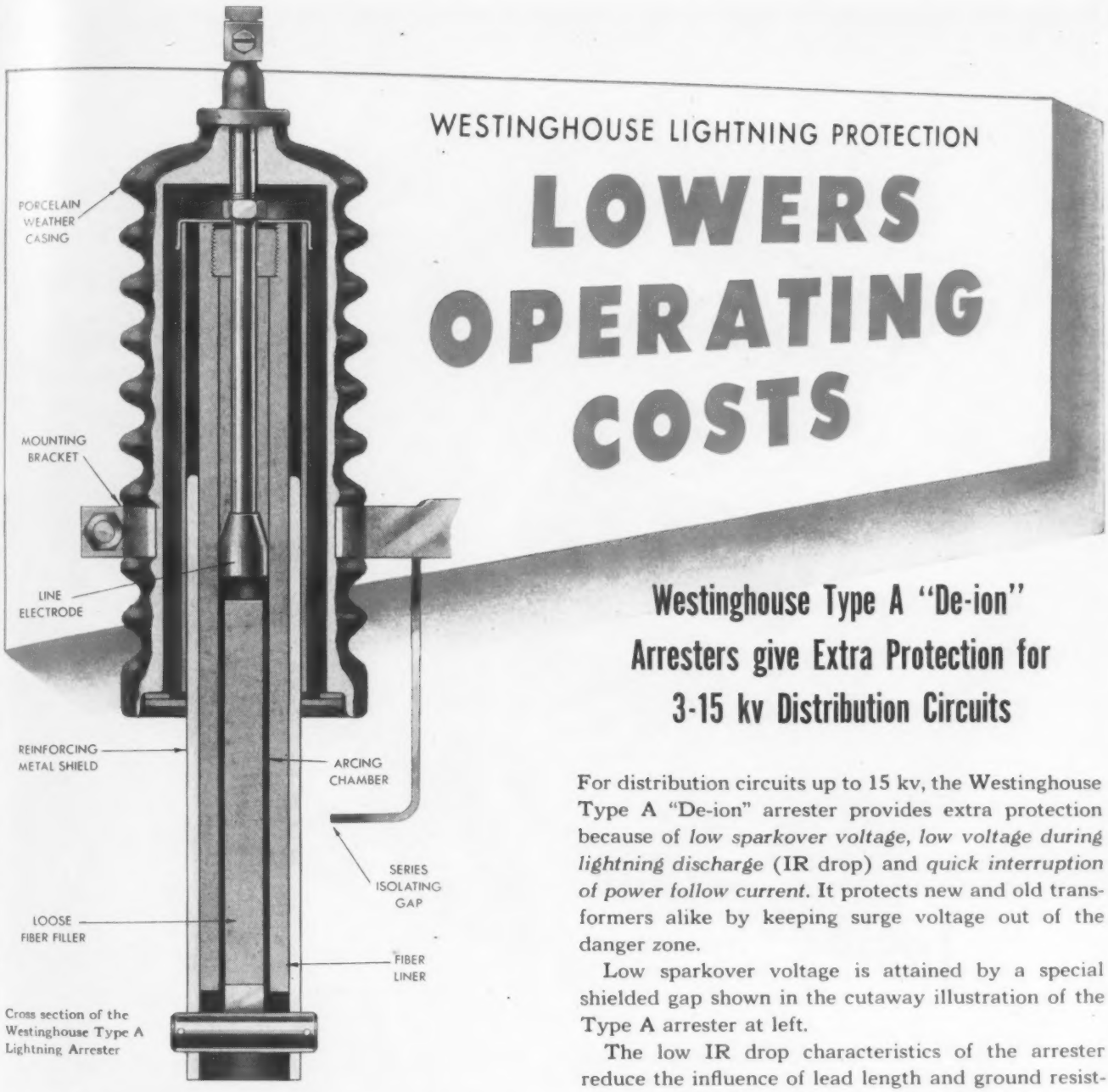
Westinghouse announces that it has ready for production, a new infrared lamp made of a special ruby red glass which will toss off water without cracking. Claimed to produce radiant heat for comfortable body warmth, the lamp has withstood a temperature shock test of more than 500°F. differential and has continued to burn even after being dipped in ice cold water. Because of its characteristics it is particularly suited for domestic use, as a spot heater in the bathroom, for drying small laundered articles, drying hair or fingernail polish or as a source of radiation where infrared has been recommended for therapeutic purposes, the company states. This lamp screws into a regular household light socket, consumes 250 watts, utilizes a bulb having a self-contained hermetically sealed-in reflector.

De-Icer for Stock Tank (1113)

An electric stock-tank de-icer that floats on the surface of the water to keep ice from forming has been developed by General Electric. About the size of a large pancake, the de-icer is a hollow metal disk encircled by a heating element similar to that on an electric range. A thermostat inside the de-icer turns the current on and off as required to keep the element at just about body temperature. According to the manufacturer, there is no danger of shock or burn. The de-icer operates on regular household voltage, can be plugged in any standard outlet.

Aluminum Wall Plate (1114)

Thomas & Betts has in production a streamlined solid formed aluminum wall plate for service entrance cable up to three No. 4 wires. A drip hole in the bottom of the plate allows drip or can be used to run ground wire (No. 4 maximum). The new plate is furnished with two wood mounting screws plain, or with non-drying caulking compound for weather-proofing.



Cross section of the Westinghouse Type A Lightning Arrester

WESTINGHOUSE LIGHTNING PROTECTION

LOWERS OPERATING COSTS

Westinghouse Type A "De-ion" Arresters give Extra Protection for 3-15 kv Distribution Circuits

For distribution circuits up to 15 kv, the Westinghouse Type A "De-ion" arrester provides extra protection because of *low sparkover voltage, low voltage during lightning discharge* (IR drop) and *quick interruption of power follow current.* It protects new and old transformers alike by keeping surge voltage out of the danger zone.

Low sparkover voltage is attained by a special shielded gap shown in the cutaway illustration of the Type A arrester at left.

The low IR drop characteristics of the arrester reduce the influence of lead length and ground resistance—keeping the voltage level impressed on transformers and other equipment at low values during discharge of currents *even* as high as 65,000 amperes.

Half-cycle control of the power follow current accomplished by "De-ion" action in the ingenious arcing chamber assures reliable operation and long life. Ratings: 3, 6, 9, 12 and 15 kv for systems of any short circuit capacity.

Contact your Westinghouse Distributor for complete details on Type A "De-ion" arresters or write for Bulletin B-3417. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60573

5 FEATURES THAT CUT OPERATING COSTS

1. **FEWER TRANSFORMER REPLACEMENTS**—keep surge voltages out of the danger zone.
2. **FEWER FUSE OUTAGES**—because of low IR drop, fuse outages are reduced and transformer insulation failures prevented.
3. **LONG LIFE**—arcing chamber with loose fibre filler distributes discharges and prevents erosion of a single path. ½-cycle control of power follow current reduces wear.
4. **NO LINE LOCKOUTS**—mechanically spaced air gap prevents line lockouts.
5. **DESIGNED TO HANDLE "HOT" LIGHTNING**—high thermal capacity provides protection against "hot" lightning—surges of long duration.

There is a Westinghouse Arrester for every application

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

Lightning Arresters

The famous Fleur-O-Lier Label makes it easy for you.

And this is one time when the easiest way is the best. To get utmost fluorescent lighting fixture quality, merely specify that the fixtures bear the Fleur-O-Lier Label. You can select from scores of types and styles made by more than thirty leading manufacturers.

Then you'll have an easy mind regarding the best interests of your client. Before a fixture is permitted to bear the Fleur-O-Lier Label, it must be built to rigid electrical, mechanical, and performance specifications, and then pass exacting tests by Electrical Testing Laboratories, Inc.

Specify Fleur-O-Lier—be sure of continued satisfaction.

Naturally, Certified Ballasts and Starters are a key part of Fleur-O-Lier Certification.

Fleur-O-Lier Manufacturers, 2116 Keith Building, Cleveland 15, Ohio

FLEUR·O·LIER *Manufacturers*

CERTIFIED FIXTURES FOR FLUORESCENT LIGHTING

Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements

Whether it's for a quick and workmanlike joint, or for any of dozens of uses, an Electrical Contractor wants U. S. Security Friction Tape right within arm's reach. Non-ravelling, straight-tearing, highly dielectric and strongly adhesive, Electrical Wholesalers say:

"Play Safe—Use Security"

Make "Security" a regular item on the order pad. It pays its way many times over.

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony Program. CBS network, Sunday afternoon, 3:00 to 4:30 E. S. T.

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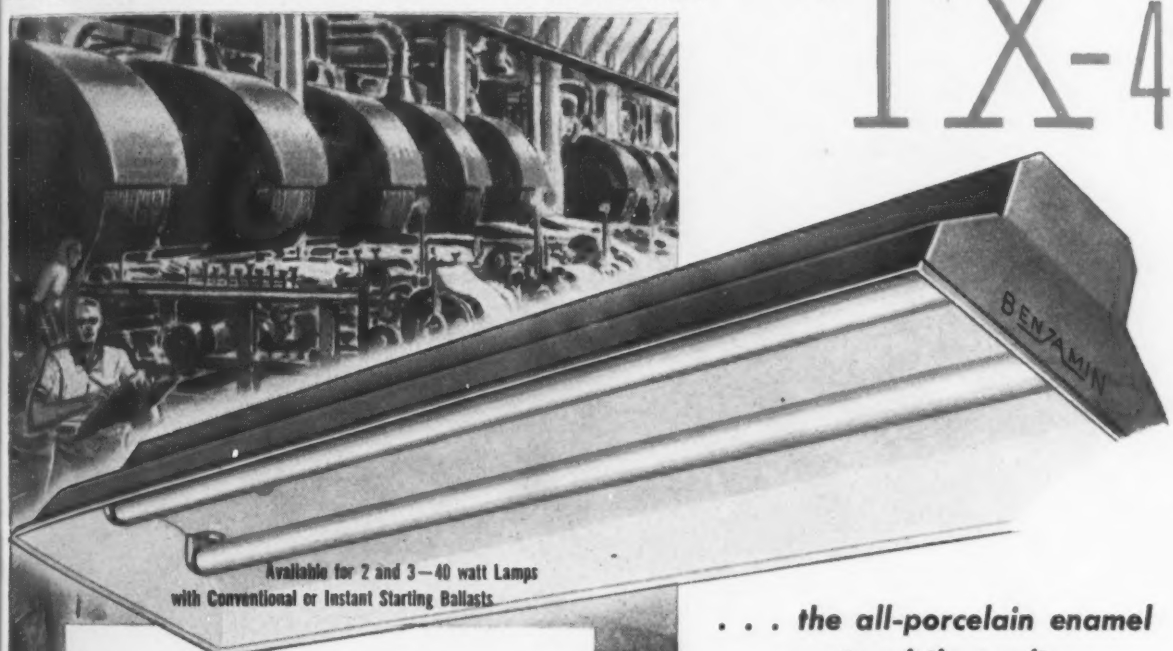
SERVING THROUGH SCIENCE

Sold Out!
• Before and after V-J day, orders have been pouring in so rapidly for Silent Sioux oil burning heating units, that today we are completely sold out through the balance of this year.
BUT . . . it's none too early for you who want to secure the profitable and exclusive Silent Sioux franchise to get full details today. A complete line of modern designed, space heaters, air conditioning furnaces, hot water heaters, etc., which hold more than just a promise of becoming America's fastest selling line. Write today.
Silent Sioux
SILENT SIOUX OIL BURNER CORP.
ORANGE CITY, IOWA

Humid, Damp and Dusty Locations call for this new one-piece Fluorescent Lighting Unit . . . . the new "TX-40"



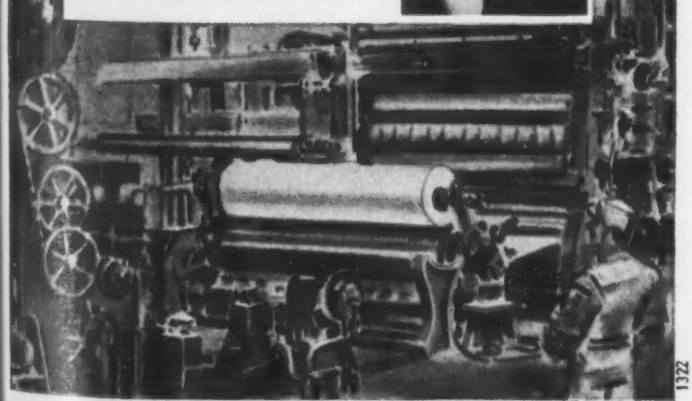
Available for 2 and 3—40 watt Lamps with Conventional or Instant Starting Ballasts

"Type TX-40" Embodies All the Advantages Found in All BENJAMIN FLUORESCENTS

- √ Benjamin Life-Time Porcelain Enamel
- √ Built-Like-A-Battleship Construction
- √ Easier Installation and Maintenance
- √ Certified Conformance to highest illumination, mechanical and electrical standards and specifications.

PLUS—

- √ SPECIAL RUST RESISTING HOUSING. Entire exterior of unit is single coated with gray porcelain enamel over a ground coat for extremely high resistance to rust. Inside section porcelain enameled with two white coats over a ground coat.
- √ ONE PIECE REFLECTOR HOUSING for durability and long life.
- √ REMOVABLE PORCELAIN ENAMEL STEEL PLATE on which control equipment is mounted forms the reflector top; removable by releasing two screws for easy wiring or inspection of ballasts.



1322

. . . the all-porcelain enamel rust-resisting unit.

Rust and other problems due to humidity and dust meet their master in the new Benjamin "Type TX-40." Now, even the most humid locations can be economically provided with fluorescent illumination through lighting units especially designed and constructed for such purposes.

"Type TX-40" Fluorescent Lighting units have wide applications in textile mills, paper mills, food plants, laundries and other process industries. In these locations the one piece all porcelain enamel construction of the "Type TX-40" unit provides durability and long life operation not possible with ordinary units. For complete data on these units and other Benjamin Fluorescent equipment . . . ***write Benjamin Electric Mfg. Co., Dept. E E, Des Plaines, Ill.***

BENJAMIN
TRADE MARK
PORCELAIN ENAMEL
Fluorescent
LIGHTING EQUIPMENT
Distributed Exclusively Through Electrical Wholesalers

KLEINS

CHOICE OF MEN WHO KNOW...

Good Tools!

Here are two sturdy tools—back from the war—ready to aid linemen and electricians with their peacetime job.

Some will choose the husky 201, favorite of "men who know good tools" for generations. Others will prefer the streamlined 201-NE with the rounded nose that gets into confined spaces and won't nick wires.

But whichever Klein they select, they are sure of getting the maximum in tool life—tool comfort—tool quality.

Klein Pliers are being made as rapidly as we can produce them, but naturally it will take some time before everyone can be supplied. Place your order with your jobber and he will fill it as soon as he can.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

This book on the care and safe use of tools will be sent on request.

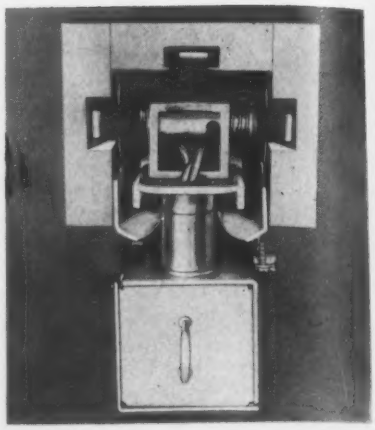
Since 1857

Mathias KLEIN & Sons

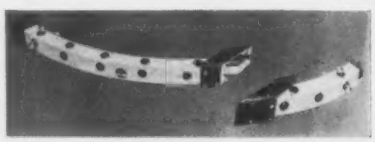
Established 1857 — Chicago, Ill., U.S.A.

3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

Duct (1115)



BullDog has a new Flared-End industrial Trol-E-Duct for transfer crane and hoist or monorail switching applications. Bus bars and bottom section are curved outward and transfer type trolleys have beveled guides and swiveled heads. Flared-Ends are available for either curved or straight duct sections, and transfer trolleys may be switched from straight to curved, curved to curved or straight to straight duct section. Illustrations show cross section of Flared-End for straight industrial section with transfer type trolley mounted inside, and curved section with Flared-Ends.



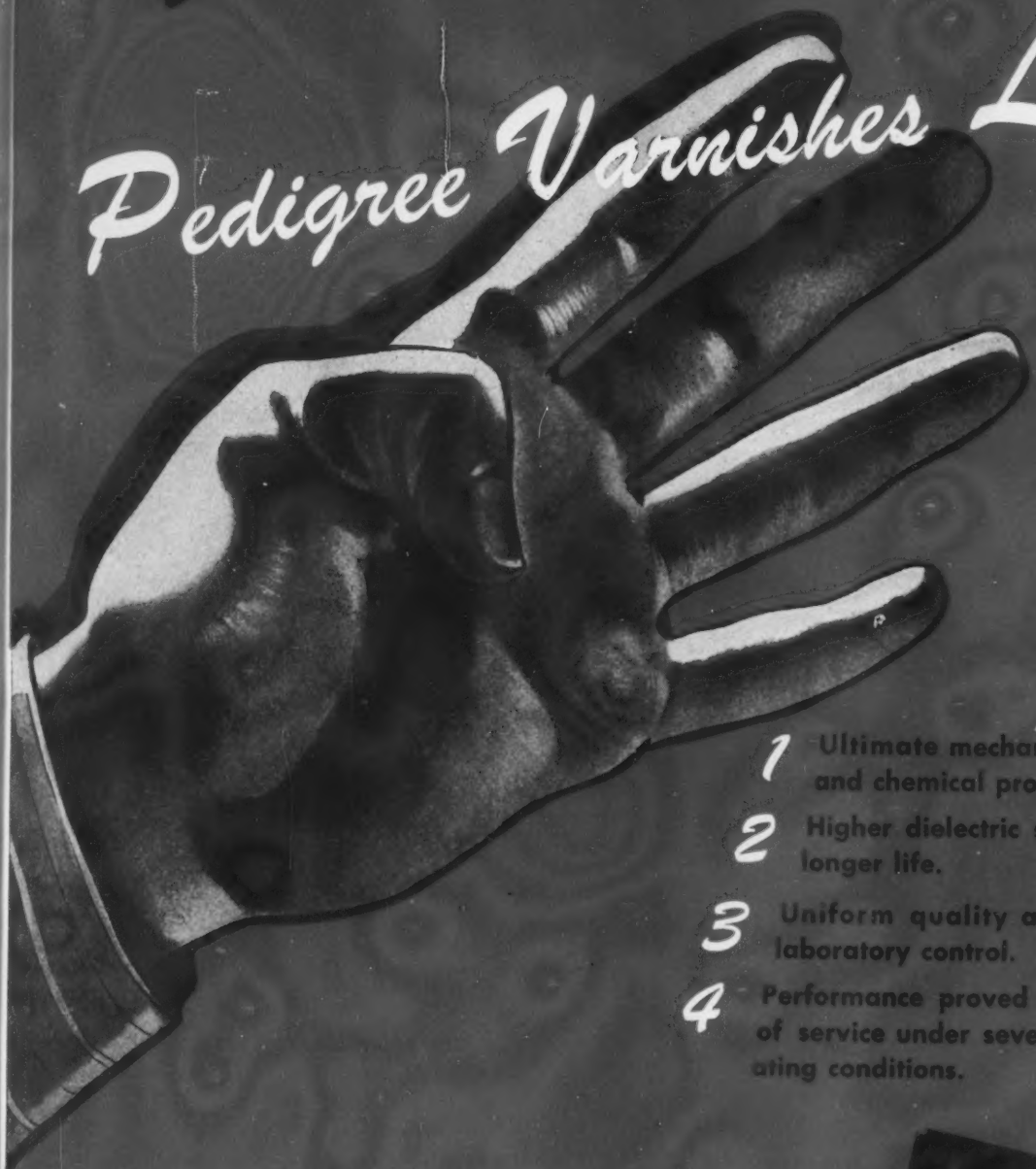
Preformed Insulator Tie (1116)

A completely preformed insulator tie, known as Grip-Flex 45, has been designed by Copperweld Steel Co. Three formed pieces make a top tie, four a side tie. Advantages over hand-wrapped ties are claimed by the manufacturer, who states that the new tie provides floating support for the conductor; reinforcing wires keep the conductor away from the insulator and the winding wire does not touch the conductor. Strong

holding power against unbalanced line tension also is claimed. This tie meets requirements of the National Electrical Safety Code. It is available for use with Copperweld and Copperweld-Copper conductors, packaged 100 complete top or side ties per carton. Several twisting tools are included in each carton.

4 GOOD REASONS WHY

Pedigree Varnishes Lead



1 Ultimate mechanical, thermal and chemical protection.

2 Higher dielectric strength and longer life.

3 Uniform quality assured by laboratory control.

4 Performance proved by years of service under severe operating conditions.

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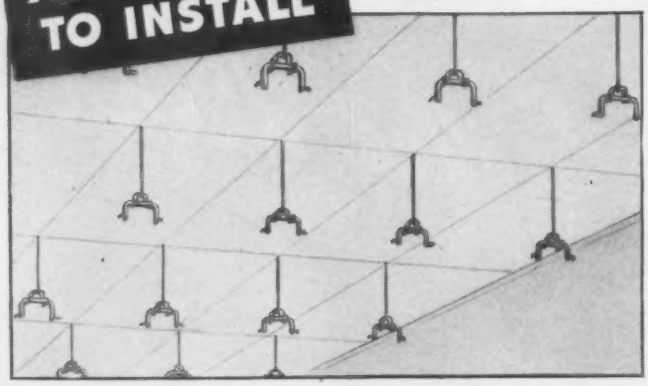
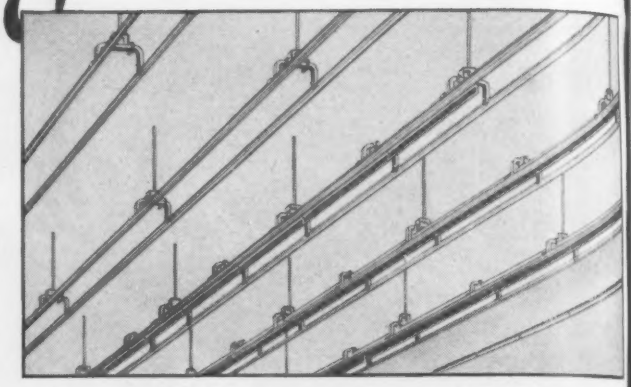
THE P. D. GEORGE COMPANY, ST. LOUIS, U. S. A.

IT'S JUST *THIS SIMPLE* TO INSTALL

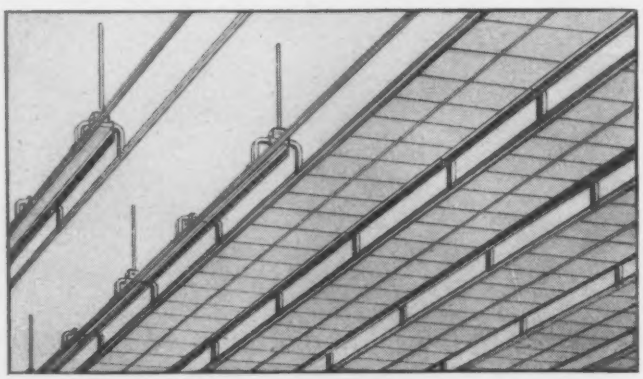
Ceilings Unlimited



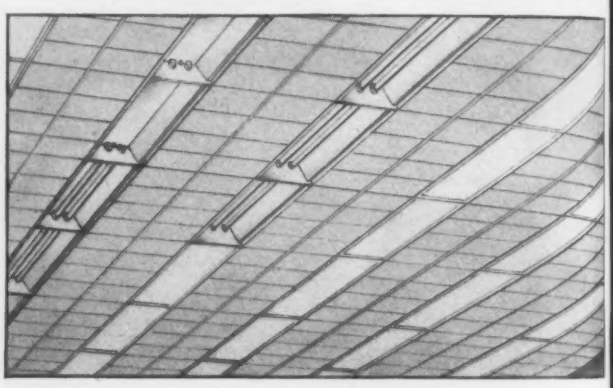
1. Suspend patented Miller Ceiling Furring Hangers from structural ceiling by rods. (The Miller System requires but half the usual number of supports... economy, plus more space above furred ceiling for air conditioning ducts, piping, etc.)



2. Suspend Furring of any type from the hangers. (Hangers are equipped with furring attachment devices to support furring of acoustic tile, metal lath and plaster and other ceiling materials. They are adjustable for leveling finished ceiling.)



3. Mount wiring channel and reflectors inside the hangers, install finished ceiling tile. (The continuous wireway channel and other Miller engineering features cut wiring costs up to 50%, conduit and conduit installation costs up to 80% —as well as many other really startling economies.)



4. Attach hinged doors to reflectors, swing them into place, lock—and that's that. (It really *is* "that's that" for Miller Fluorescent Troffer Lighting Systems are designed to solve old furring problems—without creating any *new* ones.)

Miller Fluorescent Troffer Lighting Systems

for stores, schools, offices and public buildings

The 8-foot, 4-foot or 2-foot Troffer sections may be easily combined to form innumerable patterns of practically any dimension (of two-lamp type with removable hinged doors or single-lamp ALZAK aluminum type with louvre shielding).

This versatility provides the architect with practicable instruments of expression. It is now *engineeringly* (as well as esthetically) sound to plan entire buildings—*around the lighting.*

All this is but part of the fascinating story of Miller Fluorescent Troffer Lighting Systems. The whole story is told in "CEILINGS UNLIMITED", a big new brochure—catalogue, complete with photographs, architects' renderings, working drawings and specifications.

Miller engineers, located in principal cities, will be glad to provide you with a copy—or you may write directly to The Miller Company.

THE MILLER COMPANY • MERIDEN, CONNECTICUT

ILLUMINATING DIVISION
Fluorescent, Incandescent
Mercury Lighting Equipment

HEATING PRODUCTS DIVISION
Domestic Oil Burners
and Liquid Fuel Devices

ROLLING MILL DIVISION
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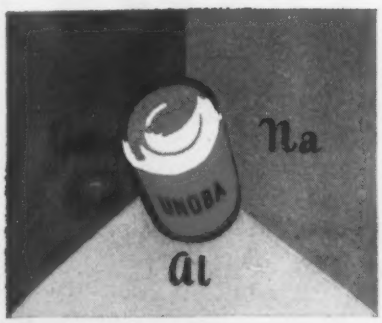
Non-Ferrous Metal Castings

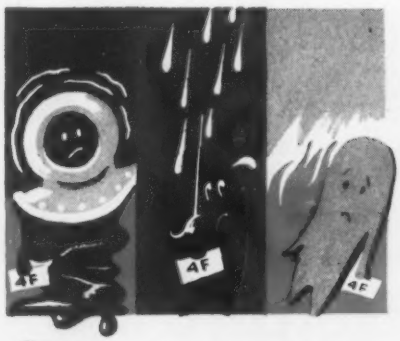
MILLER
SINCE 1844

HEATPROOF, WATERPROOF—

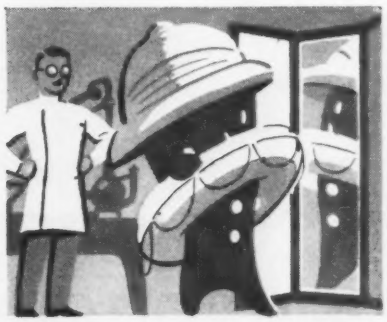
AN ALL-PURPOSE GREASE!



1. Greases have been made for years with either calcium, sodium, or aluminum as a base, depending upon the conditions under which the lubricant had to perform.

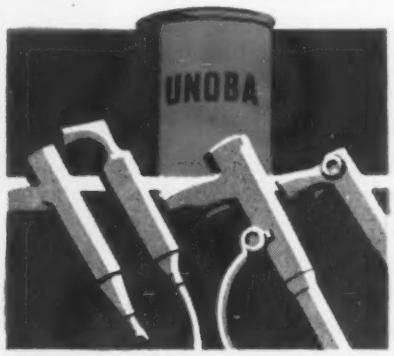


2. Calcium base grease is water-resistant but has a low melting point. Sodium base resists heat but is not waterproof. Aluminum base withstands both but jells at high temperatures.

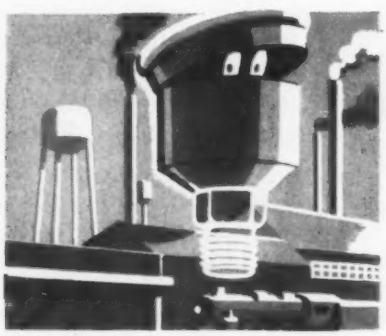


3. There was an obvious need for an all-around grease that was heatproof *and* waterproof. So, Union Oil Company developed the sensational new *barium* base grease called UNOBA.

4. UNOBA gives effective lubrication at temperatures from 0°F. to 250°F. and sticks to metal surfaces with a tenacity that boiling water can't break.



5. This unique combination of properties qualifies UNOBA as an all-purpose lubricant—one that will fill practically all your grease requirements with excellent results.



6. Try some of this heatproof, waterproof, all-purpose grease. It will protect against rust, prevent excessive wear, and prolong the life of your equipment.

Upon request your Union oilman—or the Union Oil Company, Los Angeles 14, Calif.—will gladly furnish more information and deliver a supply.

UNOBA

UNION 76

Another **UNION OIL** *Success-Tested Product*

Cooler Cables!

LABORATORY TESTS PROVE:

TRANSITE DUCTS DIFFUSE HEAT FASTER!

FROM LABORATORY TESTS lasting more than two years comes proof of the superior heat-dissipating qualities of Johns-Manville Transite Ducts.

By applying the data from the tests to specific field conditions, J-M Engineers have determined the comparative I^2R losses of underground ductways in actual operation. They have found, as a result of a number of such studies, that Transite Ducts dissipate these losses up to 13% faster than the other ductways tested.

It is apparent, therefore, that cables in Transite Ducts have a higher inherent load capacity. Or, carrying rated loads, cables will run cooler, thereby reducing copper losses and increasing cable insulation life.

Transite Ducts are strong, immune to rust and rot, incombustible, not affected by electrolysis or galvanic action. Smooth bore makes possible long cable pulls and easy replacements. Long, lightweight lengths can be quickly installed. And, a variety of fittings simplifies even the most complicated installations.

For full information write for Data Book DS-410, Johns-Manville, 22 East 40th Street, New York 16, New York.

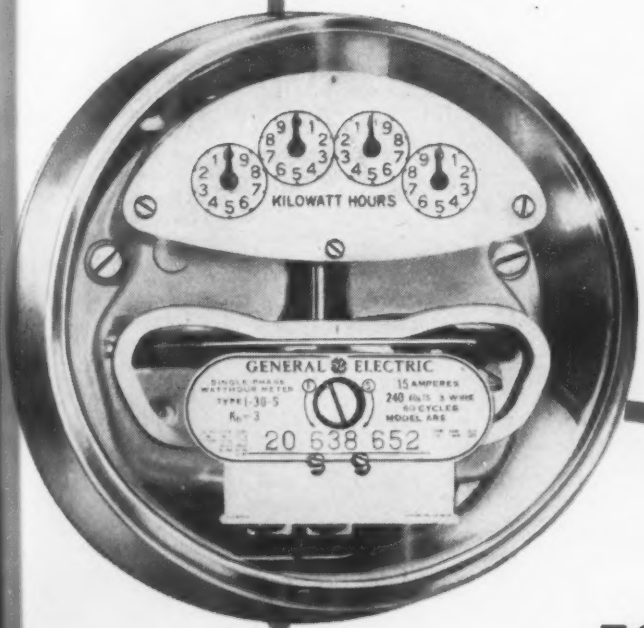
Johns-Manville ***TRANSITE DUCTS***

CONDUIT for use without concrete

KORDUCT for concreting in

JM PRODUCTS

You can count on the



I-30

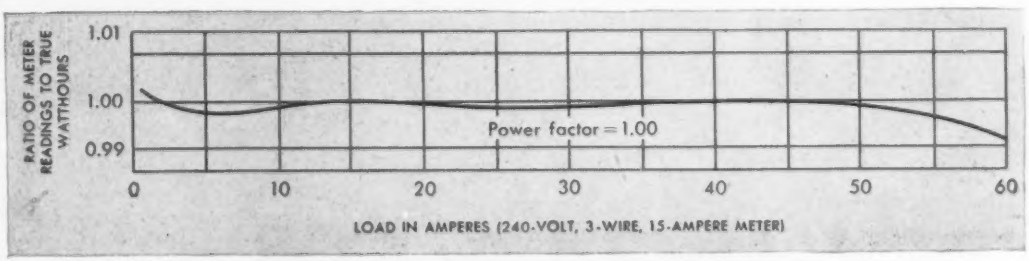
FOR INHERENT ACCURACY ON HEAVY LOADS

During the last few years, load growth has done more than anything else to prove the inherent accuracy of the I-30 watthour meter.

Inherent accuracy on heavy loads is made possible by low nominal speed and low useful current flux, which effectively overcome the error tendency of the damping torque.

Features such as these have characterized General Electric watthour meters for many years and are the basis of the long-range accuracy of I-30 meters. Include the I-30 in your metering program. It's the safe thing to do. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

WATTHOUR METERS



Headquarters for Electrical Measurement

BUY WAR BONDS

GENERAL ELECTRIC

601-16-6110

Thanks for waiting?

Uncle Sam has been served . . . **Tuttle & Kift** is proud of its contribution to the development of the **Atomic Bomb.** Although ours was a small part, the entire **Tuttle & Kift** organization went all out for the **Manhattan Project.** Thanks for waiting—we know you'll agree that the results have proven our time has been well spent.

Now we can promise you that with the knowledge gained from our war production added to our quarter century experience in the field of Electrical Engineering, we will develop and manufacture even better **T K products** than the fine ones to which you have become accustomed.

TUTTLE & KIFT, INC.

1825 NORTH MONITOR AVENUE • CHICAGO 39, ILLINOIS

MANUFACTURERS • DOMESTIC AND INDUSTRIAL HEATING UNITS • SWITCHES • CONTROLS

Radioactivity "R" Meter (1117)

Rowe Radio Research Laboratory has announced that it is releasing for general use its Type RM82 radioactivity "R" meter. It is said to measure directly very weak radiations from small quantities of radioactive materials, indicating values from 0.000001 to 20.0 "R" units. It is calibrated directly in fractions of "R" units on a linear scale of a 4-in. meter; has five "R" ranges which are selected by push buttons. Full scales on these ranges at maximum voltage are : 0.0001, 0.001, 0.01, 0.1 and 1.0 "R" units. By using minimum voltage, it is reported, the least sensitive range can be extended to 20 "R" units for full scale. The meter proper is an electronic device which measures currents as low as 0.001 of a microampere. A high-voltage power supply with adjustable output from 100 to 2,000 volts d-c is part of the apparatus, which operates on 115 volts a-c, 60 cycles.

Screw Anchor (1118)

A new all-steel, no-wrench screw anchor has been designed by A. B. Chance Co. for use in sandy soil. This anchor consists of a drop forged steel tripleye rod, double arc welded to a forged steel blade. According to the manufacturer, production methods on this anchor make it possible to control the pitch of blade or helix to the degree required for maximum holding power and minimum earth disturbance during installation. A large thimbleye on a high-strength rod admits a bar for use in screwing the anchor into the ground. It will admit one, two or three guy strands. The manufacturer states that this anchor has been tested and will hold several times its rate of strength. It is made in four-, six-, eight- and ten-inch diameters.

Traffic Controller (1119)

General Electric has a new program device which permits changes in timing of traffic control systems as often as every 12 minutes a day for six days without repetition. This device supervises the functions of the master controller in an interconnected traffic control system and can be furnished to take care of any desired number of circuits.

Soldering Iron (1120)

Sound Equipment Corp. of California has made its Kwikheat thermostatic soldering iron available on a nation-wide basis. This iron has a 225-watt heating element, with built-in thermostatic control. This iron is said to be ready to use 90 seconds after it is plugged in. It weighs 14 oz., has six different interchangeable tip styles.

Industrial Ovens (1121)

Industrial ovens for baking and drying processes up to 500°F. have been announced by the Despatch Oven Co. In sizes from 2x2x3 ft. to 4½x6x9 ft., these units are said to require only lead-in of electricity or gas for complete installation. Special safety features are included, according to the announcement.

Renewable Switch (1122)

Robert Hetherington & Son has announced a renewable switch of the plug-in, non-snap type. The company plans to furnish its entire line of switches with the renewable feature and will extend the feature to its line of environment-proof switches.

111
333
888
711-A
733-A
111
333
888
711-A
733-A

Numbers that mean immediate circuits

THERE is no wiring problem when "Metal Molding" surface raceways are used. The wires are laid in the base; the capping snaps on. It's as simple as that to eliminate fishing and tearing up walls or floors to install additional circuits.

"Metal Molding" is manufactured in three sizes; 111 "Xtensionduct" carrying two No. 14 wires, 333 "Metal Molding" for four No. 12 or 14 wires and 888 "Metal Molding" used for carrying ten No. 14 wires for branch circuit feeds. "Florduct" for surface wiring on floors comes in two sizes. 711-A "Florduct" has capacity for three No. 12 or No. 14 wires and 733-A "Florduct" carries cable up to two 26 pair. All five raceways are interconnectible with each other. These neat appearing surface raceways have a complete line of fittings having two or three different sizes of twistouts to take the various sizes of moldings.

All have a neutral gray finish which may easily be painted with either oil or water paints to match interiors. For that quick surface wiring job, use "Florduct" and "Metal Molding."

Listed and approved by Underwriters' Laboratories, Inc.

Write for catalog and handbook.

National Electric Products Corp.

Pittsburgh, Pa.

BACK ON THE JOB

T&B Sta-Kon* Pressure (Solderless) Terminals** for small wires are home after 4 years of combat service. More than a billion of them have been subjected to service tests almost beyond belief in critical locations in Radar, Sound Equipment, Fire Control, Aircraft, Tanks, Subs, and Battleships.

Electrically and mechanically tried and tested. Now available in quantity for high speed assembly line production using wire sizes #22 through 250 MCM. Scores of shapes and sizes. Reduce installation costs. Promote good working conditions by eliminating unpopular, hazardous and messy solder. Easy to use. T&B Installing Tools come in bench or portable models, and utilize any power: air, electric, hydraulic or manual.

Genuine T&B Sta-Kon Terminals, Approved by Underwriters Laboratories, are distributed through Wholesalers service organizations exclusively.

If you have unusual wiring problems, get in touch with nearest T&B office for free services of our experienced design-engineer specialists.

* Trade-mark Reg. U. S. Pat. Off.
** Patented

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The Thomas & Betts Co., Incorporated
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1645 Wazee Street
Denver 2, Colorado

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301 Eyres Bldg.
2207 First Ave., S.
Seattle 4, Washington

T&B
THE THOMAS & BETTS CO.
INCORPORATED
manufacturers of electrical fittings since 1898
ELIZABETH, 1, NEW JERSEY
In Canada: Thomas & Betts Ltd., Montreal

BULLETINS

data books, etc.

Standards (1123)

American Standards Assn. has published a new list of all American Standards and War Standards approved to date. There are approximately 800 standards listed, covering specifications for materials, methods of tests, dimensions, definitions of technical terms, procedures, etc., in the electrical, mechanical, building, transportation, textile and other fields.

Casting Weight Formulas (1124)

Formulas for calculating the weight of castings and definitions of terms used in materials testing are given in a 44-page illustrated catalogue available from Baldwin Locomotive Works. Included are the composition, applications and physical properties of 32 of the brass, bronze and iron alloys used in industrial and engineering applications.

Connectors (1125)

Cannon Electric Development Co. is offering a revised edition of its Type "K" bulletin on electric connectors. Containing 64 pages, this edition describes "K" and "RK" plugs, receptacles, dust caps, junction shells, stowage receptacles for aircraft, instruments, radio motors, geophysical equipment and general applications. Illustrated.

Resin Tapes (1126)

Resin industries has published a booklet describing Resinite tapes, compounds, tubing and tying cord.

Switch Boxes (1127)

Wiremold has issued a data sheet on its multi-gang switch and receptacle boxes.

Switch Mechanisms (1128)

Delta-Star Electric Co. has a bulletin on switch operating mechanisms and controls. It describes and shows diagrammatically nine of the more useful arrangements of mechanisms and gives phase spacing for the various types of rating from 7.5 to 161 kv.

Equipment Catalogue (1129)

Link-Belt Co. has published its standard equipment catalogue No. 850, Pacific Coast edition. This 180-page book contains information on power transmission, elevating and conveying equipment available from any of the company's six warehouses in the Western states.

Frequency Meters (1130)

Jame G. Biddle Co. describes its line of frequency meters, switchboard, portable and miniature types, in a 16-page booklet recently released. This booklet explains the resonant reed principle and vibrating reed characteristics; tells how to read the scale.

Classroom Lighting (1131)

Classroom lighting is discussed in an eight-page bulletin prepared by DayBrite Lighting, Inc. This bulletin contains data, suggested layouts and descriptions of the company's lighting equipment for this purpose.

Catalogue Sheets (1132)

General Cable Corp. has new catalogue sheets on self-supporting aerial cable. Illustrated.

Insulating Materials (1133)

Continental Diamond Fibre Co. is circulating a folder of reference material on the electrical and mechanical properties of its electrical insulating materials.

Radio Tube Development (1134)

In "20 Years of Achievement in Radio", Sylvania tells of its early history and gives developments in radio tube production.

Heat Treating Furnaces (1135)

C. I. Hayes describes electric heat treating furnaces in its new fortieth anniversary catalogue recently published.

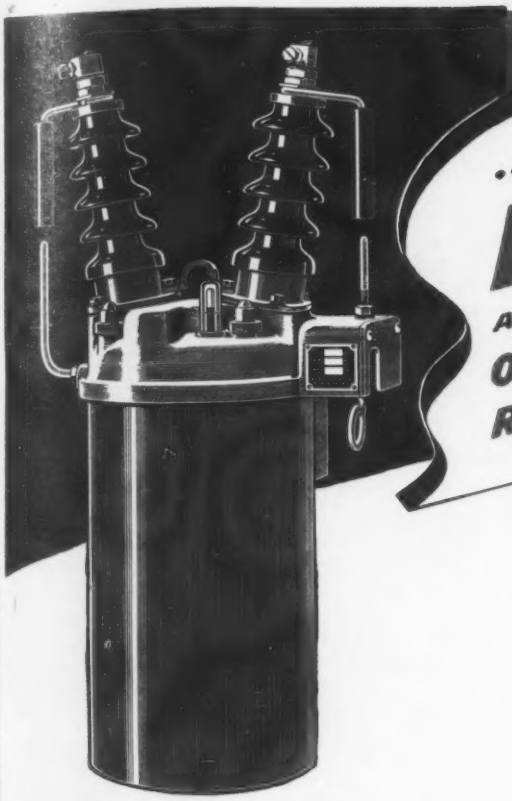
ELECTRICAL WEST, 68 Post St., San Francisco, 4, California
Please send me information about following CIRCLED items:

1100	1101	1102	1103	1104	1105	1106	1107	1108	1109
1110	1111	1112	1113	1114	1115	1116	1117	1118	1119
1120	1121	1122	1123	1124	1125	1126	1127	1128	1129
1130	1131	1132	1133	1134	1135				

Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.



...THE TYPE "H"

KYLE AUTOMATIC OIL CIRCUIT RECLOSER

Gives

LINE TROUBLES A NEW "ONE-TWO"

1 CLEAR ALL TEMPORARY FAULTS AUTOMATICALLY

2 ISOLATE SECTIONS WHERE PERMANENT FAULTS EXIST

● Line protection afforded by the exclusive dual operating characteristics of Type "H" Kyle Automatic Oil Circuit Reclosers give the improved protection for which operators of long rural distribution lines have been waiting.

Kyle Reclosers bring to such systems a combination of low installation cost, minimum maintenance cost, and a maximum continuity of service that can be secured in no other way.

While Kyle Reclosers, properly designed to coordinate with each other, can be used advantageously at all sectionalizing points, the low revenue of most short branches usually requires inexpensive fuse cutouts at some points.

Kyle Reclosers coordinate with these fuse cutouts to give the maximum continuity of service by:

1 Fast Opening of the Recloser on the first and second operations. This allows the temporary fault to be cleared without damage to the fuses.

2 Time Delay Opening on the third and fourth operations of the Recloser. This allows the fuse protecting the faulted line to blow. Where a part of a system is protected only by a Recloser, the Recloser isolates the fault by locking out on the fourth operation.

Ask your Line Material Representative to show you how the proper coordination of Kyle Automatic Oil Circuit Reclosers can best contribute to the increased continuity of service on your lines at lower cost.

Type "H" Kyle Automatic Oil Circuit Reclosers are enclosed in a steel tank with an aluminum cover. Two conventional porcelain bushings are used so that the line terminals are the only external live parts. Spark gaps are mounted beside each bushing to prevent damage by surge voltage. Operating handle and counter are protected by a hood. The handle is up when the Recloser is closed, down when it is open.

All but the lockout operations are independent of the handle. A steel hanger, welded to the tank, permits single pole mounting and a simple bracket provides for cross arm mounting.

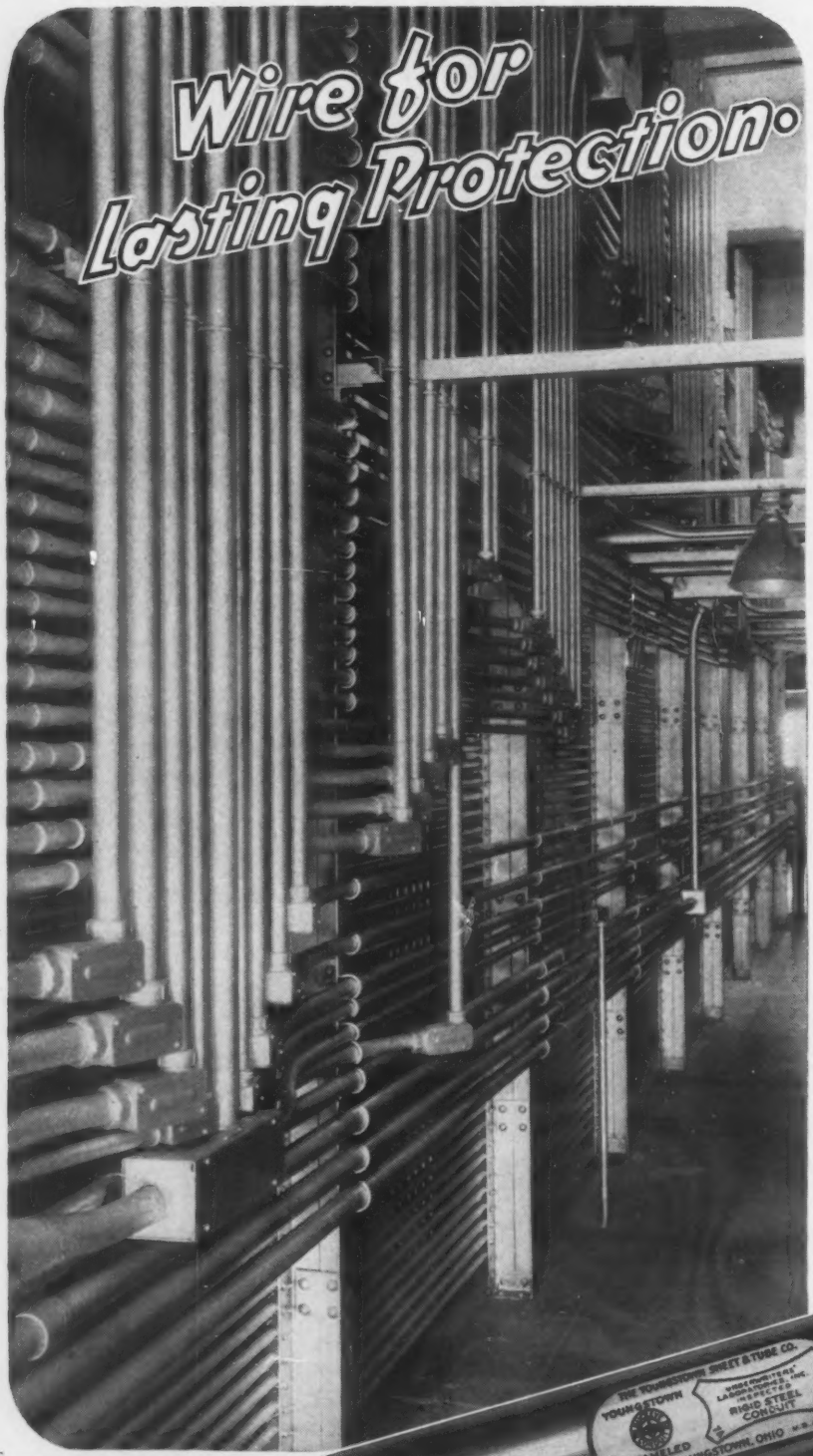
Ratings of Kyle Oil Circuit Reclosers

Voltage	2400 to 15,000
Ampere Rating	5 to 50
Minimum Tripping Current	10 to 100 Amperes
Interrupting Capacity	150 to 1200 Amperes

MADE BY KYLE CORPORATION SOUTH MILWAUKEE WISCONSIN

KYLE Circuit Reclosers are Designed and Manufactured for LINE MATERIAL COMPANY MILWAUKEE WISCONSIN

FOR SAFETY'S SAKE . . . USE CONDUIT *(Full Weight Rigid Steel)*



WHEN YOU REWIRE FOR PEACE

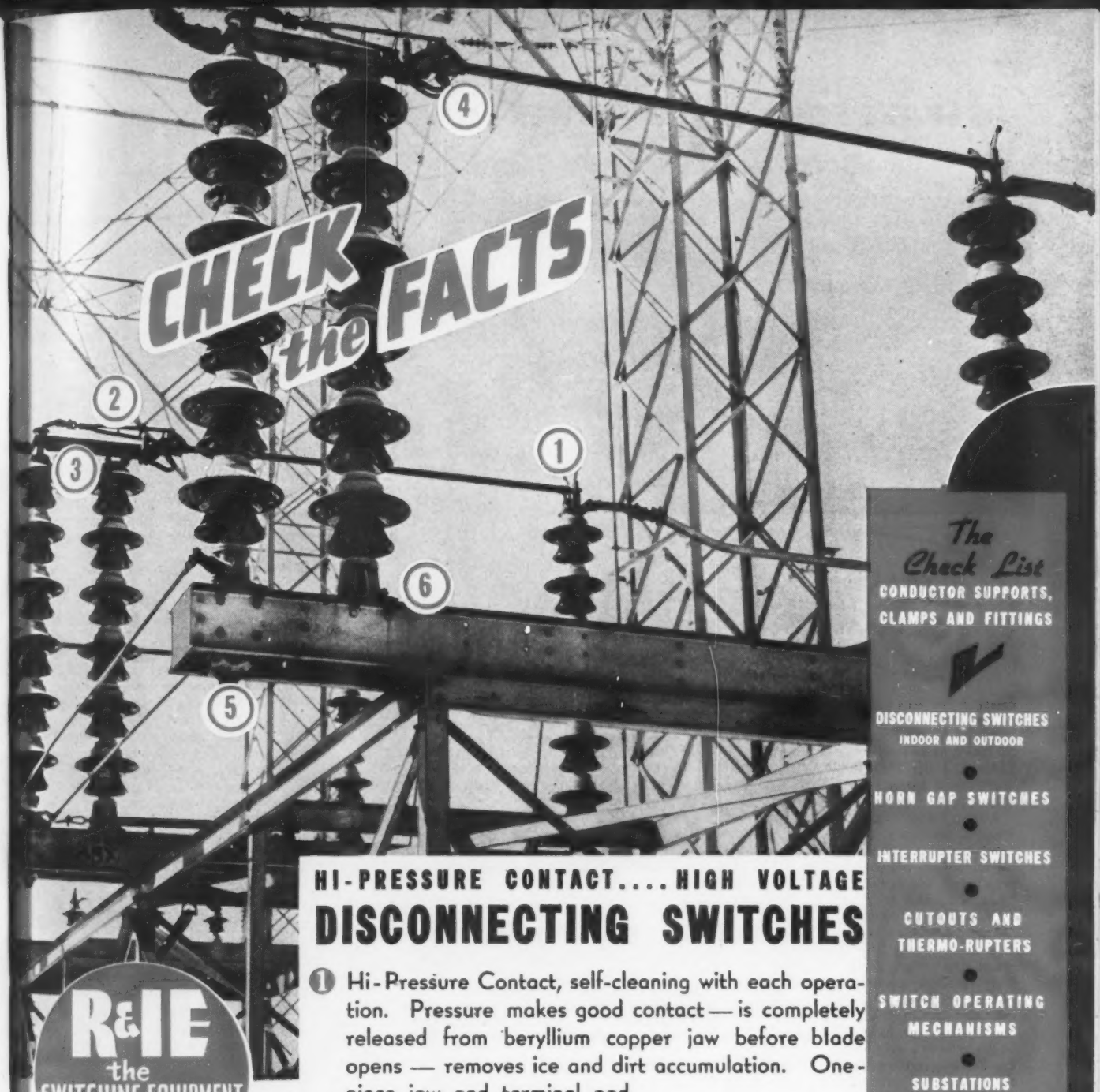
MUCH of America's war-time construction has been built on strictly an emergency basis--good enough "for the duration" perhaps, but questionably adequate for the long term. This fact, combined with the tremendous need of steel for other war uses, has been used to justify relaxation of the high standards of the National Electrical Code for the protection of electrical wiring.

Fortunately, the end of make-shift methods forced on us by war emergency is in sight. Steel will be available again in unlimited quantities. You can again use full-weight rigid steel conduit wherever you wish to provide dependable protection--especially in hazardous locations and occupancies -against moisture, vapors, dust, and explosions.

So when you rewire for the lasting peace to come, you can rewire for lasting protection, too, by using Youngstown's standard-threaded, full-weight rigid steel conduit-Buckeye Conduit.

YOUNGSTOWN
THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN, OHIO
Manufacturers of
CARBON - ALLOY AND YOLOY STEELS

Ask your distributor for:
Youngstown Buckeye Conduit-Pipe and Tubular Products - Sheets - Plates - Electrolytic Tin Plate-Coke Tin Plate Bars-Rods-Wire-Nails-Tie Plates and Spikes.



R&IE
the
SWITCHING EQUIPMENT
Specialist

HI-PRESSURE CONTACT....HIGH VOLTAGE

DISCONNECTING SWITCHES

1. Hi-Pressure Contact, self-cleaning with each operation. Pressure makes good contact — is completely released from beryllium copper jaw before blade opens — removes ice and dirt accumulation. One-piece jaw and terminal pad.
2. Simple, high strength, direct connected blade operating mechanism provides positive smooth action. Accessible for adjustment and inspection.
3. Housed counterbalance, integral with switch-frame.
4. Free moving hinge with flex connection which is designed for duty of switch, prepared and conditioned for weather and corrosion, and applied to the requirements of blade operation.
5. Weather-sealed, greaseless, anti-friction bearing for smooth switch movement—eliminates inertia and drag.
6. Heavy, built up base for rigidity. Leveling screws for perfect insulator alignment.

The Check List

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES
INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SECTIONALIZING EQUIPMENT

METAL CUBICLES

TESTING DEVICES

GARLAND-AFFOLTER ENGINEERING CORP.

SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE

PREPARE FOR COLD WEATHER NOW
with *Electric Unit Heaters*

IT ISN'T TOO EARLY!

Electromode illustrated above, in models 10 to 60 KW sizes, is for ceiling or wall suspension only. Smaller models, 1.5 to 7.5 KW sizes, may be suspended or used as portable Unit Heaters.

Now is the time to figure your cold weather heating requirements in order to be prepared when the need arises. Be ready to have heat-in-a-minute, anywhere, conveniently supplied by Electromode Electric Unit Heaters. Factory rooms, exposed areas, isolated buildings, watchman houses, hard-to-heat areas or departments—are but a few places where you can safely and easily install Electromodes.

Users have found that installation is as simple as hanging an electrical fixture, with no maintenance of piping and fittings. Electromodes furnish heat quickly, efficiently and economically, at any location where wires can be run, with no transmission heat losses en route to heater—no consumption whatever when not "ON". Electrical energy is converted 100 per cent into heat, and the warmed air is fan-circulated and distributed downward by adjustable deflectors.

Rectangular Type, Patented Electromode Heating Element... No exposed glowing resistors. . . . No oxidation or deterioration.

Electromodes owe their great efficiency, long life, and freedom from fire or explosion hazard to the patented heating element. This is a one-piece, finned, aluminum encased heating element. Since the fins are an integral part of the casting, there are no dead air spaces to hinder efficient radiation. Because of this exclusive design and large convection surface, Electromodes have great B.T.U. output (from 5122 to 204,900) at a safe, low operating temperature. Electromode Unit Heaters are made in a wide range of standard capacities and all can be automatically controlled by thermostat if desired.

HOW TO ESTIMATE FOR PROPER SIZE ELECTROMODE

The "Watts Per Cu. Ft." method for roughly estimating the heat loss for rooms of average construction and from 0° F to 70° F.

DESCRIPTION	WATTS
1. Interior room, little or no outside exposure	1.25
2. Average rooms, moderate windows and doors	1.50 to 1.75
3. Rooms with severe exposure, great window, door space	2 to 4
4. Isolated rooms, cabins, watch houses, similar buildings	3 to 6

EXAMPLE FOR ROOM OF *AVERAGE* EXPOSURE (Use factor 1.75)
12 x 13 x 10 = 1560 cu. ft.
1560 x 1.75 = 2730 watts (2.73 KW)
Use 3 KW Heater (Electromode AN-30)

EXAMPLE FOR ROOM WITH *SEVERE* EXPOSURE (Use factor 4)
10 x 13 x 9 = 1170 cu. ft.
1170 x 4 = 4680 watts (4.68 KW)
Use 5 KW Heater (Electromode BN-50)

You'll find Electromode Unit Heaters the efficient answer to many of your heating problems. For complete dimensions and data, write for Bulletin 46-U and Heating Survey Form. ELECTROMODE CORPORATION, Div. of American Foundry Equipment Co., 436 So. Byrkit St., Mishawaka, Ind.

ELECTROMODE
Electric Unit Heaters

BOOKS
you may want

POWER SYSTEM STABILITY, Vol. 1, by Sheldon B. Crary, 291 pages, 5½x2⅜, 152 figures, index and appendix, John Wiley & Sons, $4.

Modern power systems transmit large blocks of electrical energy over long distances between generating plants and load areas. The economics of such transmission facilities are such that the engineer must plan to carry as large a block of electrical energy as the physical and electrical characteristics of the network involved will permit. To properly solve such problems, a thorough knowledge of system stability and its limitations must be had. This book provides such information, all presented clearly and in logical sequence. A thorough discussion of power flow is given, followed by a description of synchronous machine power angle characteristics. Other chapters cover stability limits, general relations of composite systems, long distance transmission, transmission line electrical loading and application of stability criterion for networks.

Particularly valuable chapters are those discussing the economic study of lines and system designs, as the proper solution of a network problem is usually its over-all cost, including maintenance and operation.

The appendix gives a good review of the per unit representation of quantities and the generator inertia constant. The book is recommended to all engineers working with the transmission of power through electrical networks.—F. S. B.

UNCLE SAM'S BILLION DOLLAR BABY, by Frederick L. Collins, 174 pages, 5 x 8, C. P. Putnam's Sons, $2.50.

In this book on the TVA, the author attempts to answer three questions: Shall we have more TVA's? Shall government ownership supplant American business? Shall we go Socialist, as England has? Mr. Collins has investigated claims made for TVA by government writers and has made a series of visits to the project itself and to power plants operated under business management. In his book, he declares that the TVA type of social experimentation imperils the foundations of our whole economic and political system and expresses the opinion that it is time that adulatory articles, pamphlets and other material coming from Washington about the TVA receive a challenge.

The author exposes the fact that TVA pays no interest and very little taxes and shows how TVA style bookkeeping turns losses into profits. He further exposes the fallacy of the many multi-purpose dams that have been built and in other ways shows up TVA as unsoundly conceived, deliberately misrepresented and as a purely social experiment.

BALL AND ROLLER BEARING ENGINEERING, by Arvid Palmgren, Dr. Eng., 270 pages, 8x10, curves, tables, graphs and formulae, SKF Industries Inc., sold at cost to students and others interested in bearing studies. A comprehensive discussion of the design and characteristics of anti-friction bearings, as well as their application to mechanical equipment. Intended to serve as a fundamental text on all phases of bearing applications to industry.

SPECIAL LISTING
LARGE AMOUNTS
GOVERNMENT SURPLUS

STEEL

FOR IMMEDIATE DELIVERY

Reconstruction Finance Corporation has for sale in excess of 50,000 tons of steel plate, sheet, structural shapes and bars that have been declared surplus property. The partial list of items shown below is indicative of the large and varied stock on hand.
Immediate inquiry regarding your prospective needs is suggested, in view of constantly changing inventories.

WIDE FLANGE BEAMS

10″	77#	8′3″	to	33′ 2″	8″	35#	19′	to	38′
10″	112#	9′5″	to	37′10″	8″	31#	8′3″	to	25′ 3″
10″	89#	25′3″			6″	15.5#	17′	to	69′
10″	49#	16′6″	to	33′ 2″	6″	18#	8′6″	to	59′ 3″
8″	24#	8′6″			6″	20#	9′9″		
8″	27#	8′6″			6″	22.5#	6′4″	to	49′ 6″
8″	48#	8′3″	to	33′ 6″	6″	25#	8′1″	to	32′ 6″
8″	58#	9′6″	to	25′ 3″	5″	13.5#	8′1″	to	25′ 7″

$2.30 per 100#

PLATES

Gauge	Width	Length
3/16	62″	363″
5/16″	36″ to 62″	246″ to 483″
3/8″	12″ to 92″	123″ to 663″
7/16″	68″ to 86″	309″ to 363″
1/2″	32″ to 96″	132″ to 405″
9/16″	76″	339″ to 585″
5/8″	43″ to 98″	153″ to 345″
3/4″	74″ to 110″	147″ to 459″

$2.30 per 100#

MILD STEEL BARS — FLATS

Gauge	Width	Length
1/4″	2″	27′
1/4″	3″	20′ to 35′
3/8″	4″	21′
3/8″	5″	20′
3/8″	6″	10′ to 30′
1/2″	4″	21′
1/2″	6″	22′ to 25′
1″	4″	15′

$2.30 per 100#

TEES

12″	37#	30′	to	50′
12″	40#	30′		
10″	29.5#	26′3″	to	51′ 3″
9″	48#	36′	to	4′
9″	27.5#	20′	to	3′
9″	23.5#	30′		
9″	25#	9′3″	to	47′ 3″
7″	17#	14′	to	42′ 6″
6″	20#	9′3″	to	27′10″
5″	10.5#	11′9″	to	35′ 4″
5″	38.5#	9′3″		
5″	13.5#	10½′	to	27′
4″	8.5#	30′	to	33′
4″	15.5#	9′9″	to	39′ 6″

$1.75 per 100#

ANGLES

9″	x 4″	x 1/2″	30′			
7″	x 4″	x 1/2″	28′	to	30′	
6″	x 4″	x 1/2″	8′	to	49′	
6″	x 4″	x 7/16″	7′	to	30′	
6″	x 4″	x 3/8″	8′	to	50′	
6″	x 4″	x 5/8″	47′			
4″	x 3½″	x 3/8″	10′	to	41′	
3¼″	x 3½″	x 3/8″	49′	to	50′	

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ELECTRA'S HUSBAND

Happy Ducks

IT'S all in the point of view. From a duck's point of view it made for contentment, and when ducks are happy they grow fat.

Leave it to the wise Chinese to reason it out that way. To us more conceited occidentals the thing would not be obvious at all. We try to reason things from our own point of view. Perhaps we have a lot to learn in that respect, if we are to get along in the world, either with humans or ducks.

What caused all this philosophizing to Electra was something one of the power company men down south told me recently. He'd been called to advise because there was some trouble with the voltage at a duck farm run by a well-known Chinese-American farm-businessman. He was a good customer too, used 200 100-watt lamps, burning all night long, besides soil heating cable for brooders and electricity for many other uses.

"Why on earth the 200 100-watt lamps burning all night?" wondered the power engineer. The only answer he got from the district man was "For protection." Protection of what? Of ducks. From what? Surely not from predatory animals, for in all the literature of lighting there is nothing that indicates that certain kinds of light will drive away animals. It might keep prowlers away. Yet all those lights burning all night? What could they be for.

A visit to the immaculately kept duck farm brought many surprises. The proprietor, a well educated, University of California graduate, American-born Chinese, received the power man with great courtesy and showed him the duck farm with concealed pride. The farm raised premium quality ducks for Chinese restaurants throughout the state. The problem was one of voltage drop because of too long runs.

But the power man's curiosity was aroused by the number of lights involved, burning all night. They were over a large yard where the ducks roamed by day and slept by night, arranged in rows as for a parking lot. But just why were they necessary? The power man asked his Chinese host.

That was very simple, he was told in only enough words to tell the reason, no more. It protected the ducks. No, not from predatory animals, because a strong, high fence did that. But from fear.

When the ducks slept, all rather close together, any sound at night would startle them. In the dark, unable to see whether there was anything to fear, the ducks would awaken, startled, and start to flap their wings. This would waken others and they too would flap their wings. Soon the whole yard would be in an uproar.

That would be bad for the ducks. Such unwonted exercise made their muscles tough and fiberous. The flapping of the wings would cause bruises which left red streaks in the meat. When they were killed, and there is an art to killing them too so that they do not struggle fiercely, the blood does not run out of them easily as it should for best market duck. And what is worse, ducks so excited, weigh a pound less than more peaceful ducks.

Purpose of the lights on all night was to make happy ducks. If they wakened from noise in the night, on opening their eyes they could see all around them and find it all peaceful. Instead of flapping their wings they would put their heads under a wing and go back to sleep, or perhaps they would get up quietly and go over and eat a little and then go back to sleep. They were all happy and contented that way.

And that weigh too, for the happy ducks all weighed more for market, their meat was soft and tender, no more streaks, no more tough fibers. They brought a premium price in any market. And when there are 75,000 ducks sold per year from this farm, at say 50 cents a pound, that extra pound means $37,500. It really pays to make the ducks happy.

Who of us would reason it out so from the duck's point of view?

So it was protection for the ducks after all, but in a different sense than the one usually considered.

SPEAKING of point of view, when Electra exploded the other evening it made me wonder. "Thank goodness, we'll get some courtesy at the shops and stores again," she said, with the air of who has suffered.

Yes indeed, it is beginning to peep from under the wraps in many places. But one aspect of it—maybe I am borrowing trouble—sort of worried me. A good friend recently returned from Mexico and, if what has taken place down there is an indication, we may live in no less charming but exasperating country, way things are drifting.

Down there, my friend said, he called on the manager of a mnaufacturing plant on sort of an electrician's holiday. He was graciously received but when it came to passing information back and forth, the so-called manager pardoned himself. "You see, though I am the owner, or was, of the plant, and its manager, I really don't have a thing to say about its management. That is done by the union committee. I wouldn't even need to show up around here except that they might eliminate my job altogether."

"No," he continued in course of conversation, "I can't hire or fire anyone. The union steward has to do that. If one of the peons gets drunk either the steward sends him home, or lets him stay. If he passes out, then I can ask some of the boys to drag him out to the gutter and leave him there. By-and-by, a motorist may wish to park at that spot, so he calls a policeman and the wagon takes him away. Oh, I'd get into all sorts of difficulties with the union and the government if I tried to take any initiative. That's not the way it is done down here."

Recalling that and watching the trend in this country, I wonder if the management has the right to ask its employees to try to be courteous. The labor board might construe that as trying to influence the employee. Some recent contracts prohibit lighting salesmen from working at night, when there is lighting to be done, even though offered time off to compensate for such evening calls.

May end up with only the manager being courteous, because that's all he will have to do.

IN A moment of relaxation the old-timer electrician, a foreman and superintendent for a contractor, was reading the Sunday paper. In the book section was an advertisement of Henry Wallace's new book, *60 Million Jobs*. The old-timer thought a moment. "Hm," he mused, "60 million jobs? At the usual percentage that would mean about six million business agents. Wonder if Henry included them in his calculations?"

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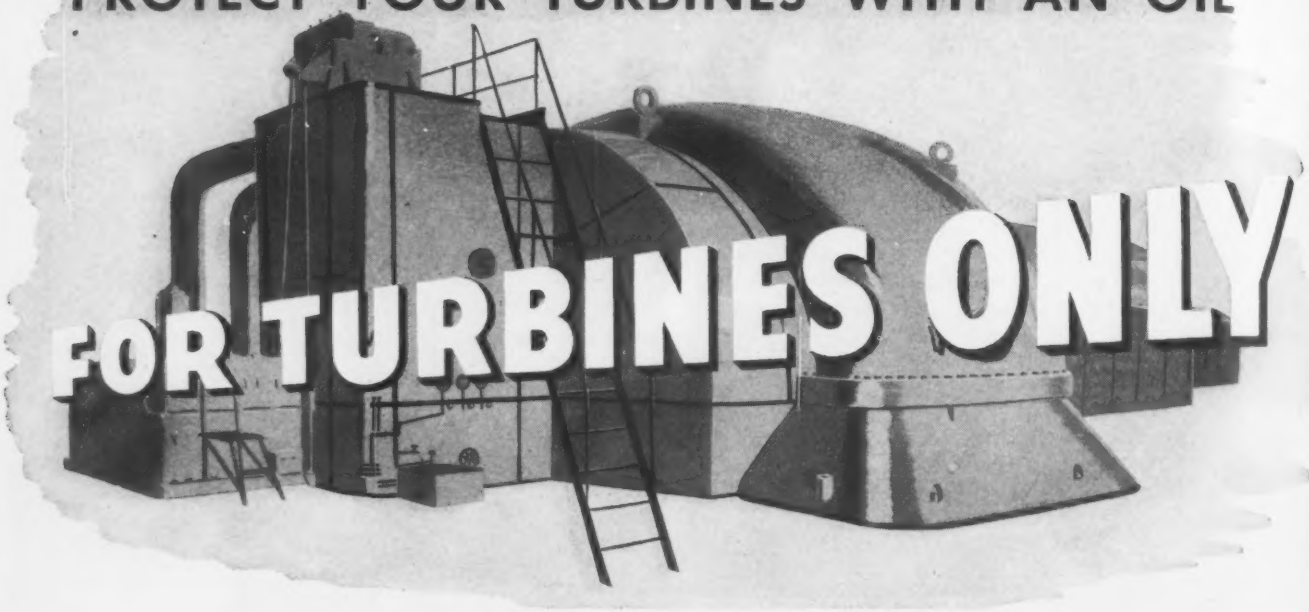

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1. **It must resist oxidation**
2. **It must resist emulsification**
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That's why Shell engineers these three "musts" into Shell Inhibited Turbo Oil. From the ground up it's selected, refined, and compounded exclusively for turbines.

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(INHIBITED)

Shellengineered for the job

ELECTRICAL WEST

NOVEMBER, 1945
VOL. 95 NO. 5

WIND SHE BLOW LIKE HURRICANE

Daniel I. Anzini

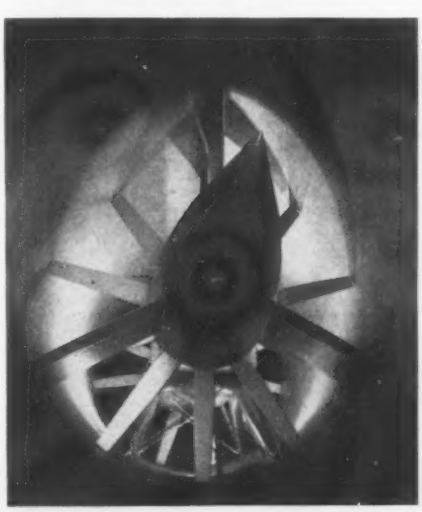
General Electric Co., San Francisco

ALTHOUGH little publicity has been given to the wind tunnels of the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics at Moffett Field, Calif., because of its secret nature, they are very interesting both electrically and mechanically. Operations of this organization have been growing quite rapidly until they are now the largest single connected load on the system of the Pacific Gas and Electric Co. Total horsepower of the main drive motors for the wind tunnels now in use or under construction is more than 150,000 hp., with an additional 25,000 hp. in small motors and test facilities, and 15,000 kva. in transformer capacity serving smaller incidental loads. Not only are the loads interesting from their magnitude, but also from the variety of their application — ranging in horsepower sizes from 1/100 to 50,000 hp., in frequencies from zero to 400 cycles, and voltages from 120 to 6,600 volts.

The National Advisory Committee for Aeronautics was established by Act of Congress on March 3, 1915, and consists of 15 members appointed by the President, and serving without compensation. Two each are from the Army, Navy and Civil Aeronautics Authority, one each from Smithsonian Institution, Weather Bureau and Bureau of Standards. The other six are specially qualified civilians. Duties of the committee are to supervise, direct and conduct scientific research on the problems of flight with a view to their practical solution. It is the intent of this organization, which is a separate government agency reporting directly to the President, to provide such necessary facilities and personnel so that its research for the Army, for the Navy or the Civil Aeronautics Authority would result in the United States being pre-eminent in the technical development of aircraft.

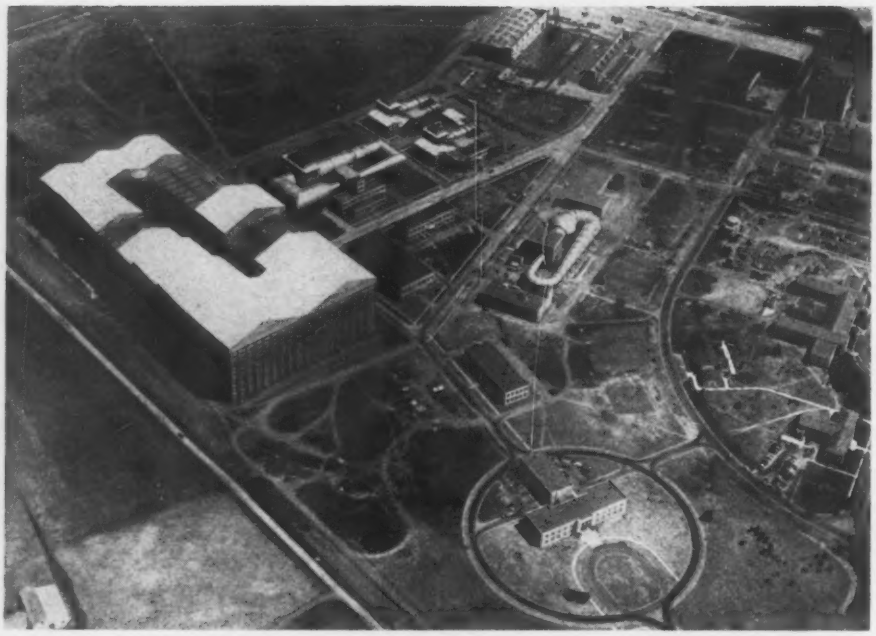
Above—Sixteen-foot wind tunnel powered by two 13,500-hp. motors to set up wind velocities up to 700 m.p.h. Cross section varies from 16 ft. diameter at throat or test section to a maximum (70 to 80 ft.) at the other end

Below—Upstream view of motor nacelle and propeller blades in 16-ft., near speed of sound wind tunnel



The original facilities were provided at Langley Field, Va., and these were enlarged from time to time to keep pace with the rapidly accelerating rate of aeronautical progress, but it soon became evident that there were several limitations at this location, one of these being electric power.

It was decided to find an additional location having an abundance of power at reasonable cost. Moffett Field, situated about 35 miles south of San Francisco and only about 20 miles from the Newark substation of the Pacific Gas and Electric Co., which has one of the largest concentrations of power of any substation in the United States, not only satisfied this requirement but also provided an excellent climate, together with the land-



Air view of Ames Aeronautical Laboratory of NACA at Moffett Field, Calif. Nine wind tunnels are either in operation or under construction

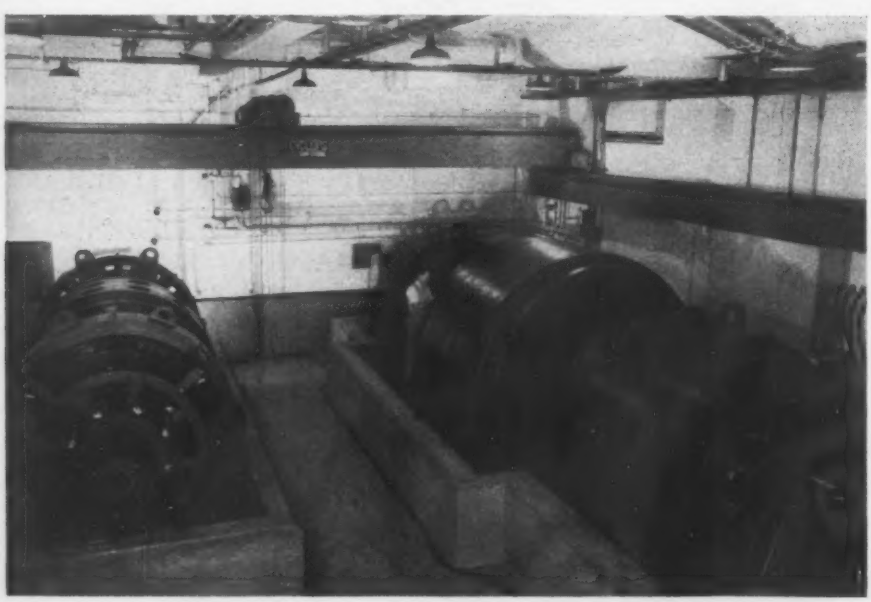
ing field facilities of the adjacent U.S. Navy Air Base. Accordingly, in 1940, construction was started on the Ames Aeronautical Laboratory. Since then there have been one or more wind tunnels under construction at all times until today there are nine tunnels in operation or under construction. Personnel of the laboratory which totals over 800 is under direction of Smith J. De France, engineer in charge with the electrical facilities under J. A. White, chief of the service division, ably assisted by A. G. Buck.

The purpose of a typical wind tunnel is to provide an enclosure for the circulation of air over an actual or model plane under test so as to simulate in reverse the relative speed of the plane when flying in air. A fan is provided to circulate this air, and consists generally of one or more electric motors mounted in the tunnel and directly connected to propellers. The over-all outside dimensions of a wind tunnel structure may vary from a small one 50 ft. long by 20 ft. wide, to one 800 ft. long and 400 ft. wide. The horsepower required varies as the area of the test section and as the cube of the speed of the air. As shown on p. 69, the cross section of a tunnel varies, being a minimum at the throat or test section. In general, most of the tunnels are of the atmospheric type having an internal air pressure somewhat near that of the outside air, although for certain tests special tunnels are available in which lower air pressures can be obtained, such as that experienced at altitudes up to 50,000 ft., or pressures greater than atmospheric.

In operation an actual plane, model plane or wing section is mounted in the tunnel on supports which are connected to measuring devices outside of the tunnel. In this manner the relative magnitude and direction of the various forces on the plane can be measured. Air pressure devices are also installed over the several surfaces so as to measure the distribution of forces over these surfaces. From these test data, the comparative efficiency of various designs can be calculated.

Wind Tunnel Data

Tunnel	Size and Kind of Drive Motors	Type of Speed Control	Total hp. of Drive Motors
16 ft.	2—13,500 hp. induction	Clymer	27,000
40 x 80 ft.	6— 6,000 hp. induction	Modified Kraemer	36,000
12 ft.	1— 9,000 hp. induction 1— 1,250 hp. d-c	Slip regulator and Ward-Leonard	10,250
7 x 10 ft. No. 1	1— 1,600 hp. d-c	Adjustable voltage	1,600
7 x 10 ft. No. 2	1— 1,600 hp. d-c	Adjustable voltage	1,600
1 x 3½ ft.	2—1,000 hp. induction	Variable frequency	2,000
1 x 3 ft. Supersonic	4— 2,500 hp. synchronous	Constant speed	10,000

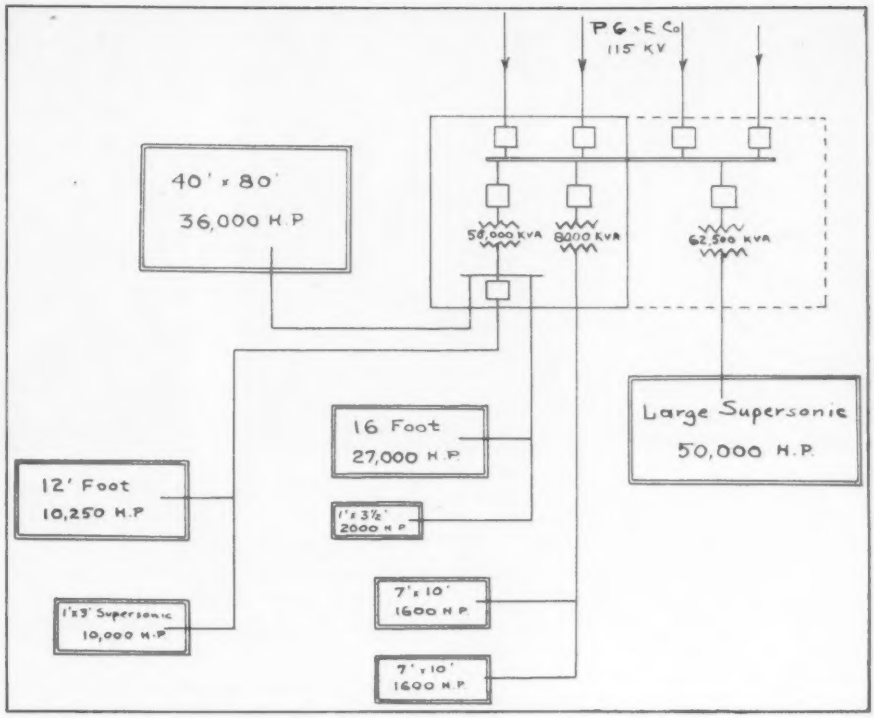


Three-unit motor generator sets A and B, left to right, used in connection with the Clymer speed control system

The 16-ft. (diameter of throat at test section) totally enclosed wind tunnel is equipped with two 13,500-hp. motors mounted inside of the tunnel and directly connected to propellers as shown on p. 69. This installation has been one of the most efficient high-speed tunnels in the world, having a wind velocity of approximately 700 m.p.h., or as the aeronautical engineer says, a Mach number of 0.9 Mach number is the ratio of air speed to the speed of sound, a Mach number of one being approximately 765 m.p.h. at sea level conditions. This is also known as sonic speed. Speeds below this which have fractional Mach numbers are known as subsonic, and those above which have integral Mach numbers are known as supersonic.

Another of the tunnels, which is the largest in the world, has a 40x80 ft. throat section, and is able to test small bombers or fighters having wing

Fig. 1—Schematic diagram of power loads for tunnels at Ames laboratory



spreads up to 72 ft. The planes under test may be run under their own power with a pilot in the cockpit. This is also an atmospheric tunnel of medium speed and is equipped with six 6,000-hp. motors, each driving a 40-ft. propeller.

Supersonic tunnels having air speeds up to 2,000 m.p.h. are for the study of air flow phenomena above the speed of sound. Three tunnels of this type are either in operation or under construction, ranging in horsepower from 10,000 to an expected 50,000 each.

A fairly complete list of the tunnels in operation or under construction with the individual horsepowers of their main drive motors is given in the accompanying table. Dimensions in the wind tunnel title refer to the size of the throat or test section.

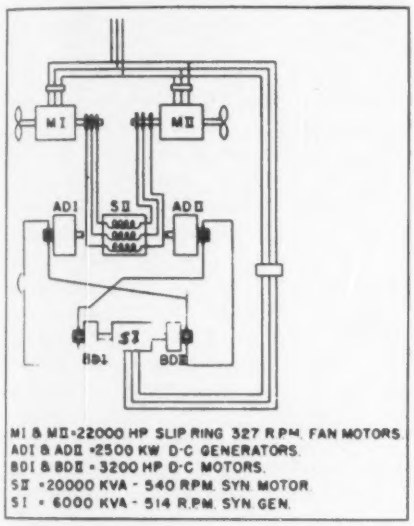
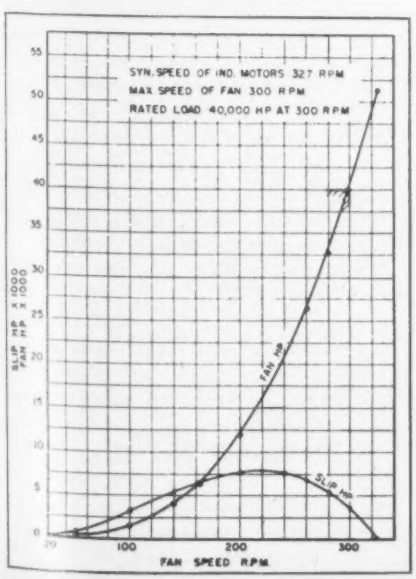


Fig. 2—Upper: Schematic connection diagram for Clymer control with double motor drive using counter revolving propeller. Lower: Speed-horsepower chart of a propeller type fan, with slip energy for wound-rotor induction motor drive. Rated load 40,000 hp.


SYN. SPEED OF IND. MOTORS 327 RPM
MAX SPEED OF FAN 300 R.P.M.
RATED LOAD 40,000 HP AT 300 R.P.M.
SLIP HP. X 1000
FAN HP. X 1000
FAN HP
SLIP HP
FAN SPEED R.P.M.

In addition to the main drives of the wind tunnels, there is approximately 15,000 hp. in large compressors and frequency changer sets, and another 15,000 kva. in transformer capacity for incidental power for small motors, lighting and other facilities.

Power Supply

Upon completion of present construction, the main power supply substation will consist of three transformer banks as follows:

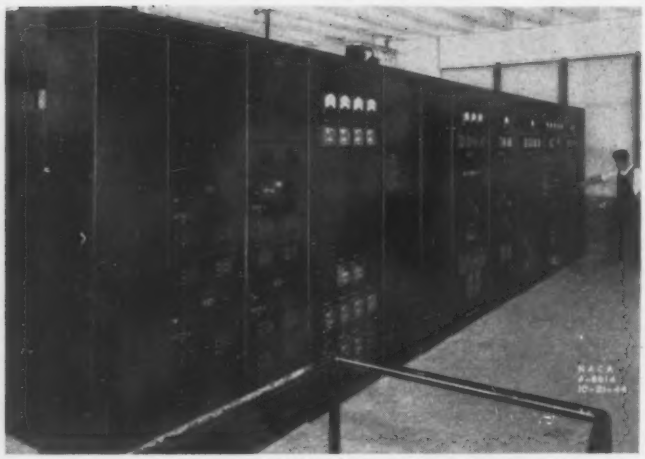
One 5,000/8,000 kva. bank
One 30,000/50,000 kva. bank
One 37,500/62,500 kva. bank

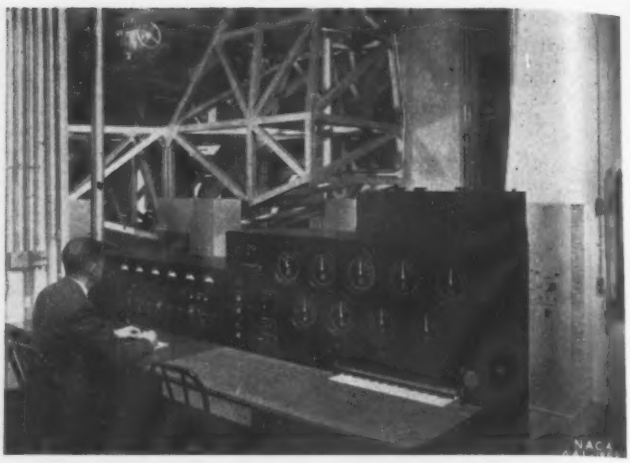
All transformers are rated 115,000 to 6,600 volts delta and are double kva. rated, the lower being the self-cooled rating, and the higher their rating with fans. Grounding transformers are also provided for each bank as well as suitable reactors to keep the interrupting capacity to a reasonable value. This load now being served by the Pacific Gas and Electric Company with two incoming 115,000-volt lines will have two additional lines making a total of four which can be connected to any of six available circuits. Metering is provided on the high-voltage side. All equipment except the metering and incoming line breakers is owned by the National Advisory Committee for Aeronautics. A schematic diagram of power loads for wind tunnel drive is shown in Fig. 1.

For the subsonic-speed tunnels a wide range of speed control is required. In general, this is obtained in either of two ways: One is the Clymer system, sometimes called a modified Kraemer drive, wherein the main drive wound rotor induction motor instead of having its slip rings connected to a rheostat has them connected through two three-unit motor generator sets to the line. In explaining the operation of these auxiliary motor generator sets, it might be well to refer to Fig. 2, which gives a schematic connection diagram with double motor drive, using counter revolving propeller. The collector rings of the main drive motors M-I and M-II, are electrically connected to the stator of the synchronous machine S-II which, together with the d-c machines, AD-I and AD-II, constitute the adjustable-speed motor generator set B. This together with set A is shown in one of the accompanying photographs.

Either the synchronous motor S-II or the d-c machines AD-I and AD-II, can act as motors or as generators. The d-c machines AD-I and AD-II are connected electrically to two other d-c machines, BD-I and BD-II, which, together with a synchronous machine S-I, constitute the constant speed motor generator set A. Each of the d-c machines, BD-I and BD-II, as well as the synchronous machine S-I can also act either as motors or generators.

Sequence of operation is as follows: The relatively small constant-speed motor generator set A is started readily in the conventional manner and being small, takes low inrush power. By applying excitation to the d-c machines BD-I and BD-II and AD-I and AD-II, the motor generator set B is brought





All of the control switchgear is metal clad with elevating breakers. At left is a view of the switchgear for the 16-ft. wind tunnel and on right is shown control desk from which switchgear and all operations are remotely controlled

gradually to its full speed. Excitation is then applied to the synchronous motor S-II, with the oil circuit breakers to the main drive motors M-I and M-II still remaining open. When the motor generator set B is running at a 60-cycle speed with the main motors at standstill, the latter acts as a transformer and 60-cycle power exists simultaneously at both sides of the oil circuit breakers serving these motors. It is relatively easy to match exactly the frequency and voltage and to close the circuit breakers with no line disturbance whatever. After this, the motor generator set B is slowed down by means of field control on the d-c machines and in this manner the main drive motors are speeded up to the desired operating speed. Excitation of the synchronous machine S-II can be adjusted to correct the power factor of the main drive motor.

When the main drive induction motors are operated at reduced speeds, the slip energy is employed to run the motor generator set B, where this energy is converted into d-c power. This power minus conversion losses is used to operate the motor generator set A, where the d-c power is converted again to a-c power of line frequency and is returned to the incoming line. It is interesting to note in this connection that the maximum amount of slip energy to be handled by the motor generator sets A and B is only 18% of the maximum power required to drive the propellers at their maximum speed. This is plainly shown on the speed-horsepower curve of Fig. 2. Thus the capacity of the motor generator set, due to the fan-duty load, is much less than the capacity of the main drive motors.

From the above, it may be seen that this arrangement creates a minimum disturbance to the system on starting and has the ability of feeding the slip energy back through the auxiliary motor generator sets to the line instead of wasting it in resistor control.*

The second speed control system, which is a combination of slip regulator and adjustable voltage control, uses a medium size d-c motor and a much larger a-c wound-rotor induction motor connected together on the same shaft. Since the horsepower required increases as the cube of the speed, the d-c motor which is supplied from a separate motor generator set furnishes all of the needed power up to half speed. At that point the induction motor is connected to the line and course speed control obtained by means of a slip regulator or "water box" and fine speed adjustment from the d-c motor which is now used as a vernier speed regulator.

The motors for the supersonic tunnels are in general constant speed with the necessary air speed variation control being made on the compressors. Either synchronous or wound-rotor induction motors are used, depending on the size and characteristics needed.

At the time of the original installation the size of the motors and the total capacity installed indicated that 6,600 volts delta was the logical utilization voltage, but as both the number and size of the units kept increasing the currents to be handled, and the effect of the higher interrupting capacity on the switchgear presented something of a problem. This has been solved as indicated in Fig. 1, by supplying the loads from two separate buses, and thereby limiting the short circuit interrupting capacity on each to not over 500,000 kva.

All of the control switchgear is of the metal-clad type with elevating breakers as shown above. Complete relay protection is provided, as well as surge protection on the various large motors. The switchgear is remotely operated by the test engineer from his control room as shown.

Testing is carried on 24 hours a day, six days a week, although under normal operation a tunnel may be running only a small part of the time, as considerable time is required to make changes in set-ups or conditions of operation. To improve the resultant low load factor, a complete remote telemetering installation is being provided which will indicate the instantaneous kilowatt load as well as the kilowatt-hour demand at each of the tunnels as well as on the main control board in the dispatcher's office. This will prevent the starting of two or more large loads simultaneously, or of exceeding the predetermined maximum demand.

In addition to the main drive units, there are a large number and variety of auxiliary electrical devices; for instance, there is over 10,000 hp. in motors which are used in place of the conventional gasoline motors to drive the propellers on model planes being tested in the tunnels. These range from 2-hp. units to 1,000 hp. These must be small and compact as indicated by a 35-hp. motor which is 4 in. in diameter and weighs 25 lb. or by the 1,000-hp. size which is a water-cooled induction motor having a diameter of 28 in., a length of 38 in. and weighing 3,800 lb. Speed control for these motors is provided by 9,000 hp. in variable frequency motor generator sets providing frequencies from 0 to 400 cycles.

Innumerable electronic devices, airborne wire recorders, high-speed photographic equipment, high-speed tachometers, gauges of all kinds, and all of the accessories which are part of a complete research laboratory, are found here, as well as the equipment of the planes themselves. Not only devices readily available on the market are here, but also facilities to make any of the special requirements that any flight or test engineer may need.

* For further details on this type of drive, refer to AIEE technical paper 42-65 of December 1941, on "Large Adjustable Speed Wind Tunnel Drive", by C. C. Clymer.

House Heating by Thermal Storage

Electric house heating with water thermal storage system tried in Spokane. Flexibility of system makes possible fitting house heating into central station load curve in any manner desired

H. C. Bender and L. Lore Wartes
Spokane, Wash.

DEVELOPMENT of electric house heating is presenting many interesting problems. Killowatt-hour consumption is several times that for other residential use. Moreover, electric house heating will cause new peaks which, taken with other characteristics of the load, makes it a matter of concern to everybody connected with the electrical industry.

One of the approaches to electric heating is through the use of thermal storage either to eliminate the heating peaks, or to be used to keep off the system electrical peaks or both. During the past season, an experiment in thermal heating has been carried on in Spokane with a patented unit developed by L. L. Wartes, who collaborated in the preparation of this article. The unit tested is called Heatervoir, views of which are shown.

This unit, shown diagrammatically, consists of a boiler of about 550-gal. capacity, built somewhat like a doughnut. It has a center air passage 24 in. in diameter, through which air is directed to pick up the boiler heat from fins projecting into this area. This experimental boiler measures about 7 ft. in diameter, and is 4½ ft high.

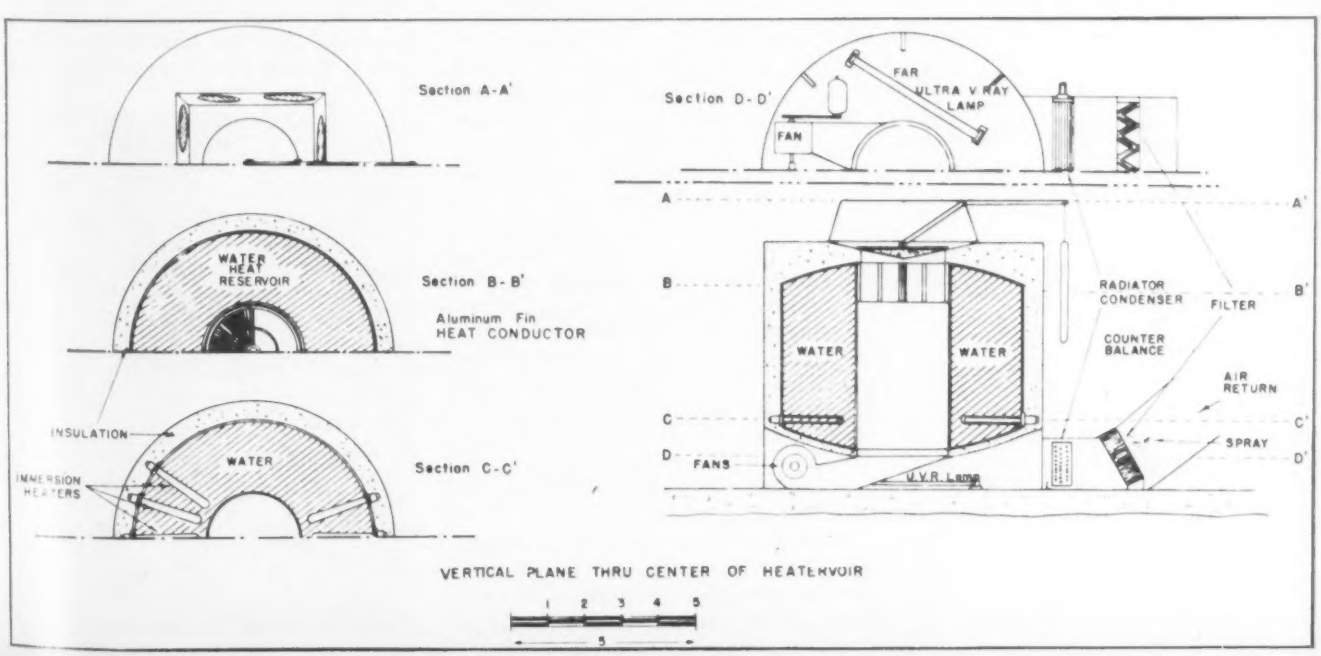
The boiler is equipped with six heaters. There are four 5-kw. and one 4-kw. immersion heaters. The 4-kw. heater has three heat positions, namely 1, 2 and 4 kw. for this single heater. Thermostats can be set so that 1, 2, or 4 kw. will be used continuously by the furnace according to the heat requirements of the house and, at the same time, from one to four of the 5-kw. immersion heaters can be turned on during off-peak periods. For example: 2 kw. may be fed into the furnace 24 hours a day which would be the estimated minimum heating load required. In addition to this, at 10:00 a.m. 5 kw. will turn on and stay on for one hour, turning off at 11:00 a.m.; at 2:30 p.m. the 5-kw. heater turns on again and remains connected until 4:30 p.m.; again, at 9:00 p.m. the heater turns on; and finally at 11:00 p.m. 10 kw. (5, 10, or 15 kw. are possible and can be used) additional are added. This final block which was added at 11:00 p.m. will turn off when the heat reservoir has attained a temperature in excess of 300°F. or because the time clock has turned it off. In average winter weather, it will be on approximately three hours. The 5-kw. unit will continue on and turn off at 6:00 a.m. by the time clock or prior to that time if a temperature of 320° has been attained in the storage compartment.

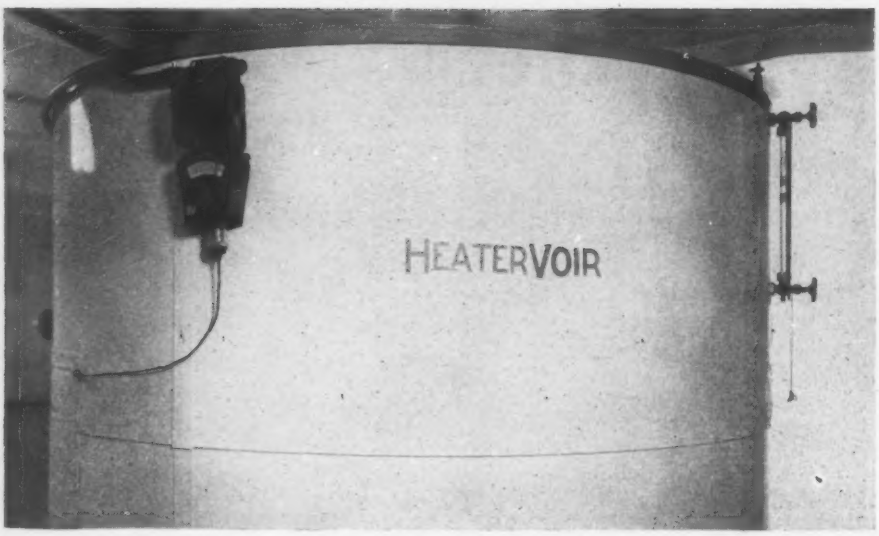
Essential features of electric house heating furnace using stored hot water principle to control both the time and magnitude of the power demand

The load picture for 24 hours would in this case be as follows:

	Hrs.	Kwh.	B.t.u.
2 kw.	24	48	163,824
5 kw.—10:00 a.m.-11:00 a.m.	1	5	17,065
2:30 p.m.- 4:30 p.m.	2	10	34,130
9:00 p.m.- 6:00 a.m.	9	45	153,585
10 kw.—11:00 p.m.- 2:00 a.m.	3	30	102,390
Total	138		470,994

Using these in combination, it is possible to turn on one, two, four, five, six, seven, nine, ten, etc., kilowatts of electric heat for any operating condition. In addition, there is a 5-kw. fin type heater in the air stream at the top of the boiler. The purpose of this fin type heater is to supply a small amount of heat at the beginning and end of the heating season when the boiler operation is not required. A fan, filter, germicidal lamp, and humidity supply make up the balance of the equipment.





Heatervoir electric house heating unit stores heat energy in a 550-gal. tank of water to carry over peaks on system

The unit is controlled by a cycling thermostat. This thermostat operates an insulated counter-balanced damper at the top of the Heatervoir unit. The number of cycles is controlled by the heat requirement of the house. When the thermostat opens the damper, it automatically starts the fan and spray. The germicidal lamp was kept on continuously. The thermostat can be set for a cycle of from three-quarters to a minute and one-half operation. During the past season, it was set to operate about one minute per cycle. The unit would cycle from a minimum around 125 to a maximum of 258 cycles per 24 hours, depending upon the house requirements for heat.

Suitable safety controls are provided to control tank temperatures. A time clock was used to control the time the supply is on. For testing purposes one recording thermometer was placed in the living room and another recording thermometer in the tank. Kilowatt-hours and demand meters were placed on the electrical supply.

The first full month's record was for December 1944, and this record has been carried on continuously since that date. During the first few weeks, the 5-kw. air heater in the dome cycled with the damper and fan, but this was later cut off, so that only the tank units supplied the necessary heat until such a time as the tank was no longer needed, when this unit again took over and supplied the little heat required at the tail end of the season.

Flexibility

This heating unit is extremely flexible in its operation. It is possible to set the time clock for any off-peak operation for any period of the day, or for several periods. During the first part of the heating season, the unit was operated with 20-kw. maximum demand as an off-peak unit. In Fig. 1 is plotted the coldest week during this type of operation, and shows the varying lengths of time for 11 hours, 27 minutes, down to 4 hours, 46 minutes that this 20-kw. load was on for any 24-hour period. The degree days and minimum temperatures are also plotted on this chart. Dec. 23 was the coldest day of the heating season, with a minimum temperature of exactly 0°F. During the period of this chart, the 5-kw. air heater was cycling in addition to the 20-kw. immersion heaters. During the latter part of the heating season, the unit was operated in such a manner as to require a minimum demand. It is interesting to note that even during the December cold snap, the unit could have been operated with a maximum demand of 10 kw. for the 24-hour period.

The maximum daily consumption for Dec. 23 was 264 kwh. and this dropped to 250, 225, 244, 234, 186, and 110 on days following this 0°F. day. There was ample thermal storage available, so that, had the demand been limited to 10 kw., the temperature in the tank would not have dropped materially until it had an opportunity to recover.

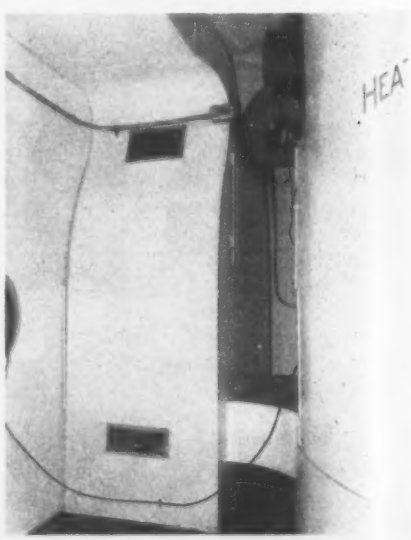
In Fig. 2 is plotted the operation during a week in May when the unit operated on a constant demand of 2.3 kw. The furnace temperature, demand, degree-days, and minimum outside temperature are also shown for this period. It is interesting to note here how the tank temperature started around 238° and dropped to 220° for a couple of days, and then returned to 253° where it actually cut off. The minimum tank temperatures followed the maximum degree-days, and the tank regained temperature as the degree-days dropped off. During the colder months, the tank temperature control was set to cut the heat off at 320°. This was progressively re-

Summary of Operation, Heatervoir Unit, 1944-45

Month	Minimum Temperature	Degree-Days	Kilowatt-Hours	Heat Factor
June	39° F.	166	900	0.430
July, 1944		29		
August		29		
September	34° F.	152	1,000 est.	
October	33° F.	331	1,950 est.	
November	19° F.	846	4,740 est.	
December	0° F.	1,132	6,342	0.444
January, 1945	17° F.	1,002	5,440	0.432
February	18° F.	837	4,650	0.441
March	2° F.	844	4,740	0.446
April	22° F.	608	3,483	0.454
May	38° F.	250	1,552	0.494
June	39° F.	166	900	0.446
Totals		6,242	34,797	0.446

House measured 12,600 cu. ft. (See method of measuring cubic contents in article on heat factor, Electrical West, May, 1945.)
House temperature maintained ..... 72°
House relative humidity maintained 40%

Cold air return contains water spray fiberglass filter and humidifying unit as well as an ultraviolet germicidal lamp



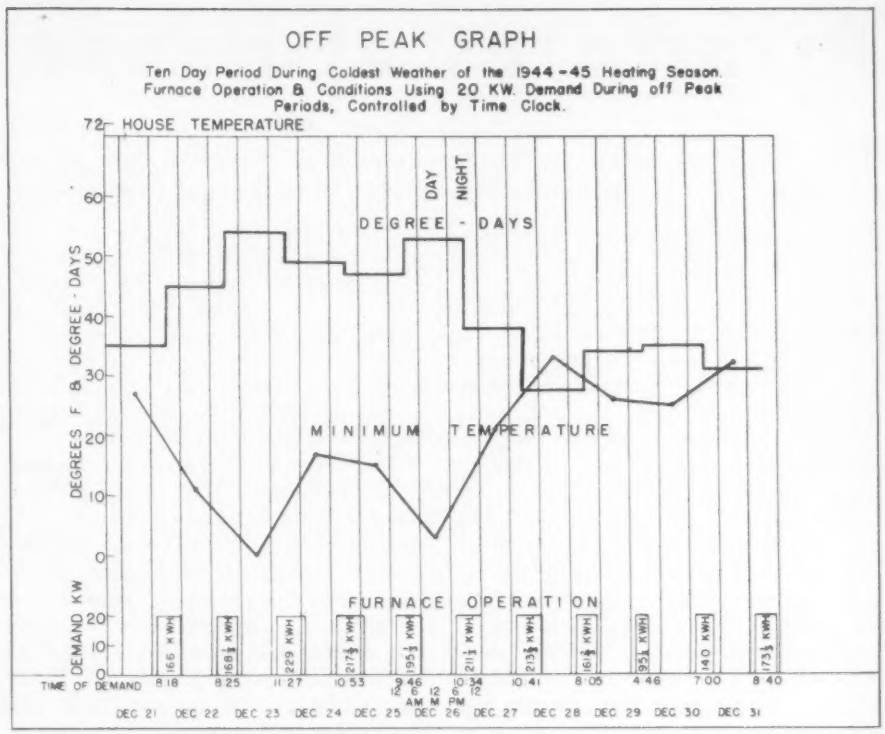


Fig. 1—Results of operating as an off-peak unit with maximum demand of 20 kw. "On-time" during any 24 hours varied from 4 hours, 46 minutes to 11 hours, 27 minutes during the coldest week of the 1944-45 heating season

duced to 235°F. as the heating season terminated. On June 13 the tank heat was shut off entirely, and the heat requirements furnished from the 5-kw. air heater in the dome of the tank.

A summary of the operation for the heating season, with September, October and November operation estimated, is given in the accompanying table. It is interesting to note in this summary the variation in the heat factor with the season or with the degree-days. (For the development of this heat factor, see ELECTRICAL WEST, May 1945.)

The 65° basis for figuring degree-days, used in obtaining the heat factor, is not correct where the inside temperature is maintained constantly at 72°F. During the colder periods, this increase over 65° for figuring degree-days does not make so much difference, but during the warmer period, it tends to show less heat requirements, and therefore would increase the heat factor. Had the home been maintained at 65°, this heat factor should remain absolutely constant. Had the home been maintained at 70°, variation in the heat factor for the heating season would have been less.

For the heating season, 1944-45, there were 6,242 degree-days, and the consumption indicated for this heating season was approximately 34,800 kwh. For the normal Spokane season of 6,323 degree-days, consumption would have run about 35,500 kwh. From a study of the heat factor and other heat factors as indicated in the above mentioned article, it is evident that the heat transmission coefficient for the walls of this house is not the best. In fact, it is almost certain that 4 in. of shavings, placed between the two layers of brick in the wall construction, are now saturated with moisture, providing an excellent path for heat to escape, rather than acting as an insulating material. Storm sash and doors were used throughout the house.

The home owner is well-pleased with the operation of this unit from a customer's standpoint. The clean, sterilized, and properly humidified air gave the home atmosphere an invigorating freshness comparable to being outdoors rather than in a heated house. The fact that flowers kept fresh longer and that bread placed on the table did not dry out pleased this customer very much. Also, the cleanliness reduced the housewife's cleaning over 50%. Undoubtedly the fact that no combustion takes place in electric heating contributed much to the fresh air feeling. Consideration should also be given to the fact that the heating surface temperature in the furnace never ranged above 320°; whereas, in combustion heating some air is actually heated to nearly 1,000°F.

A portion of the heating load in this experiment should be charged to air conditioning as the air cleaning was done by washing the air in a cold air return with a water spray having a temperature of 51°. The air was then pulled through a thin fiberglass filter on which the sprays were played. Air temperature leaving these filters approached 55° whereas, the cold air return above the air conditioning system closely approached 70°. The relative humidity leaving the wet filter would approach saturation, but on reaching the house at the elevated temperature of 72°, the humidity remained almost constant at 40%. Washing the air and filtering it in this case provides perfect humidity without regulation and as the sprays were carrying cold water no difficulty was experienced with liming of the nozzles as is found when humidity control is attempted in the warm air ducts of a heating system.

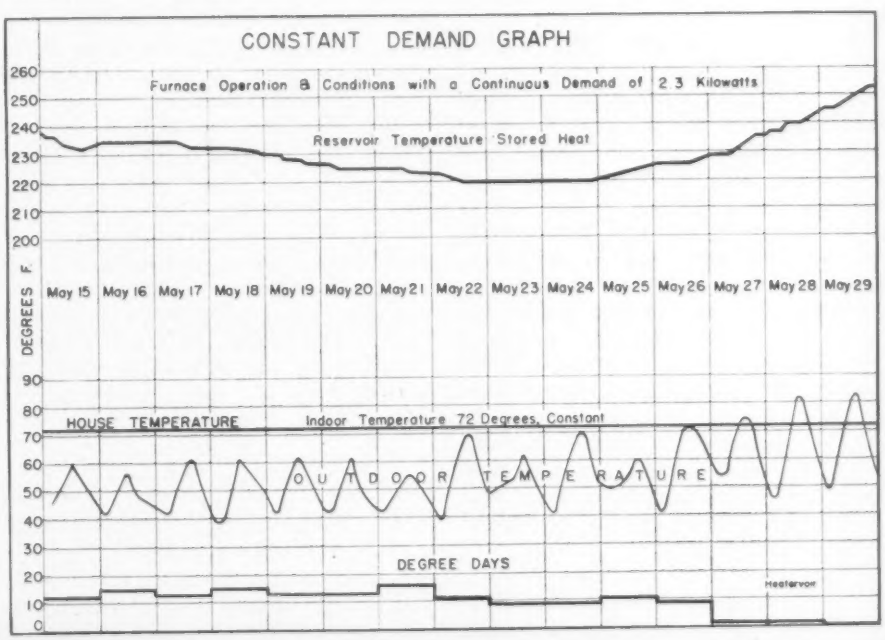


Fig. 2—Operating results with constant demand of 2.3 kw. during a May week

Principles of House Insulation

A statement of problems and methods of insulating houses to reduce heat loss for the benefit of electrical men who are coming face to face with this subject in connection with electric house heating

J. A. Hill

Pacific Gas and Electric Co., San Francisco

RENEWED public demand for electric house heating poses a number of problems which electrical men must solve if the industry expects to sell its "premium fuel" in quantity and have satisfied customers. Not the least of their worries is to see that houses to be heated electrically are easy to heat. Interest in house insulation to conserve fuel has been gaining rapidly during recent years and the public is pretty well sold. It is good business regardless of the fuel used, but with electric heat it is a *must*, even at some of the very questionable low rates being talked of (six to seven mills), particularly in the Pacific Northwest.

If electric house heating is to prove at all competitive with the latest streamlined versions of fuel fired equipment soon to appear, it is imperative that homes to be heated electrically be designed from the basement up for minimum heat loss. Many electrical problems are closely related to thermodynamics, and here again in house heating the electrical engineer will be put to his spurs thermodynamically speaking. It is for the purpose of laying down some of the basic principles in house insulation that this discussion is presented.

Heat Loss

Physics early taught us that heat is transferred in three ways, by convection, conduction and radiation. Heat loss from a house takes place by all three means. Convection losses are caused by infiltration of air through the walls or by drafts or air currents that pass through cracks and crevices in walls and floors and around doors and windows. One of the chief sources of infiltration loss is that due to the porosity of the building materials used. Porosity is a rather high factor in Western construction, particularly in the warmer climates, due to the type of construction used. With some types of building the total infiltration factor will amount to four changes of air per hour, with extremes running as high as nine changes.

Conduction losses are caused by heat passing through materials from the warmer to the colder side and then being carried away by convection, or air currents. Radiation losses are caused by direct heat transmission from warmer to colder bodies, through the air without warming it.

For practical purposes, two of these losses, conduction and radiation, combine to produce a final heat loss, so that insulating a house falls into two general approaches to the problem. In other words, there is the heat that is blown out of the house and then there is the heat that escapes by radiation-conduction-convection through the materials of which the house is built, and the hollow air spaces.

Losses caused by convection due to infiltration must be eliminated or reduced to a minimum. This is done by building paper, by weather-stripping doors and by either weather-stripping or using fixed windows. Practically the only heat insulating value of such measures and materials come from the fact that air currents and drafts are eliminated or minimized. Some types of building paper have the disadvantage of swelling when moist or wet and shrinking and cracking when dried out. There are newer types which are moisture proof and that will not crack when applied. These latter papers form an effective moisture and air barrier that minimize losses due to drafts. Still another source of heat loss is a fireplace chimney without a damper, when there is no fire in the fireplace. These are generally the largest savings to be made in house insulation.

Windows are a prolific source of heat loss. Assuming fixed windows to stop drafts, then the problem becomes one of reducing radiation losses. Double windows and double panes of glass have been widely used, but the most satisfactory and least expensive solution probably lies with some of the new special glasses, such as "Thermopane" where there is a hermetically sealed dead air space between two panes of glass.

Insulating Materials

Insulating materials to reduce heat losses are another problem. The average well insulated house will reduce heat losses by about 35%. Heat losses are reduced by introducing between the warm air of the interior and the cold air outside, materials that will have a low rate of heat transfer. The heat insulating value of these materials, of course, depends upon their character, but very importantly also, upon their density. A great variety of insulating materials have been used, the most popular one currently being mineral wool. The batt or blanket type are prefabricated at the factory and therefore are of a controlled density. Importance of density is shown by the fact that rock wool at a density of 1 lb. per cu.ft. has a conductivity factor of .45, whereas through density ranges of 5 to 8 lb. per cu.ft., the conductivity factor is .25.

Batts come in varying lengths, but the width is such that they will fit snugly between the studding or joist. Although some type of batts may be completely enveloped in a paper cover, all are made with paper backing for ease of installation, and form a seal on the inner surface. This seal protects the insulating material from moisture and effectively prevents infiltration.

Various board types of insulating material also are used, such as Celotex, Firtex, Masonite, plywood, etc. These are made up of wood or vegetable fibers pressed into sheets or boards of varying thicknesses by means of some type of binder. Such materials do not have much heat insulating value because they are used in thicknesses of ¾ in. down, and really are used more as lumber substitutes rather than for their insulating properties.

Another material introduced just before the war was aluminum foil. In this case heat loss is reduced by the polished surface reflecting back a portion of the heat which would otherwise be lost by radiation. The foil is usually applied to some form of building paper and installed with the reflective surface toward the inside. A metal foil forms one of the best air and moisture barriers obtainable.

Whenever a house is provided with heat insulating material, it is necessary to put in a moisture barrier to protect the insulating material itself so as to maintain its insulating value. Building paper or whatever is used to prevent infiltration usually serves as the moisture barrier also.

Conductivities and Conductances of Building Materials and Insulations

Material	Description	Density lb. per cu. ft.	Mean temperature deg. F.	Conductivity or Conductance (see note a)	Authority
	Insulation—Loose Fill or Batt Type				
Fiber	Made from ceiba fibers (not compressed)	1.60	75	0.24	A
	Fibrous material made from dolomite and silica	1.50	75	0.27	A
	Fibrous material made from slag	9.40	103	0.27	S
Glass Wool	Fibrous made from virgin bottle glass	1.50	75	0.27	A
Granular	Made from combined silicate of lime and alumina	4.20	72	0.24	A
	Made from expanded aluminum-magnesium silicate	6.32	56	0.29	A
Gypsum	Cellular, dry	24.00	90	0.77	S
	Flaked, dry and fluffy	24.00	75	0.46	A
Mineral Wool	All forms, typical	..	..	0.27	G
	All forms, typical (3⅝-in. thickness)	..	..	0.07*	..
Regranulated Cork	About 3/16-in. particles	8.10	90	0.31	S
Rock Wool	Fibrous material made from rock	10.00	90	0.27	S
	Rock wool with a binding agent	14.50	77	0.33	S
	Rock wool with flax, straw pulp and binder	14.50	75	0.38	A
	Rock wool with vegetable fibers	11.50	72	0.31	A
	Rock wool, granular	6.50	77	0.25	..
Sawdust	Various	12.00	90	0.41	S
Shavings	Various from planer	8.80	90	0.41	S
	From maple, beech and birch (coarse)	13.20	90	0.36	S
	Redwood bark	3.00	90	0.31	S
	Insulation—Blanket or Flexible Types				
Fiber	Typical	..	..	0.27	G
	Chemically treated wood fibers between layers of strong paper (not compressed)	3.62	70	0.25	A
	Eel grass between strong paper (not compressed)	4.60	90	0.26	S
	Flax fibers between strong paper (not compressed)	4.90	90	0.28	S
	Chemically treated hog hair between kraft paper (not compressed)	5.76	71	0.26	A
	Chemically treated hog hair between kraft paper and asbestos paper (not compressed)	7.70	71	0.28	A
	Hair felt between layers of paper (not compressed)	11.00	75	0.25	A
	Kapok between burlap or paper (not compressed)	1.00	90	0.24	S
	Jute fiber (not compressed)	6.70	75	0.25	A
	Ground paper between two layers, each ⅜-in. thick made up of two layers of kraft paper (sample ¾-in. thick)	12.10	75	0.40*	M
	Insulation—Rigid				
Corkboard	Typical	..	..	0.30	G
	No added binder	14.00	90	0.34	S
	No added binder	5.40	90	0.25	S
	Asphaltic binder	14.50	90	0.32	S
Fiber	Typical wood, cane, etc.	..	..	0.33	G
	Chemically treated hog hair covered with film of asphalt	10.00	75	0.23	A
	Made from cornstalks	15.00	71	0.33	A
	Made from exploded wood fibers	17.90	78	0.32	M
	Made from hardwood fibers	15.20	70	0.32	A
	Insulating plaster 9/10-in. thick applied to ⅜-in. plaster board base	54.00	75	1.07*	A
	Air Spaces Faced with Reflective Metals				
Foil with (emissivity = 0.05)	Air space, vertical, faced one side—3⅝-in. wide	..	55	0.34*	Z
	2 Air spaces, vertical, faced one side—total width 3⅝-in.	..	50	0.23*	Z
	3 Air spaces, vertical, faced one side—total width 3⅝-in.	..	50	0.13*	Z
	2 Air spaces, horizontal, each faced one side—total space 8-in. heat flow up	..	48	0.27*	Z
	3 Air spaces, horizontal, each faced one side—total space 8-in. heat flow up	..	48	0.17*	Z
	2 Air spaces, horizontal, each faced one side—total space 8-in. heat flow down	..	48	0.10*	Z
	3 Air spaces, horizontal, each faced one side—total space 8-in. heat flow down	..	48	0.07*	Z

(a) **Conductivities** expressed in B.t.u. per hour, per sq. ft. per deg. F. for a thickness of one inch.

Conductances, indicated by an asterisk opposite the figures, expressed in B.t.u. per hour, per sq. ft. per deg. F. for thickness stated or used in building construction, not per 1-in. thickness.

Authorities: A, Armour Institute of Technology—Tests by J. C. Peebles. G, A.S.H.V.E. Guide, 1941. S, U. S. Bureau of Standards. Z, Heating, Piping and Air Conditioning, January 1940—Tests by G. B. Wilkes, F. G. Heckler and E. R. Queer.

Applying rock wool batts in spaces between studding as heat insulation. Heat losses are reduced by about 35%

Insulating materials of the fill type can be any one of a number of loose or granular materials packed between the walls. Ordinary sawdust (a picnic ground for termites) was one of the earliest of these. In California, rice hull ash has been widely used for a long time. More recently, redwood bark, vermiculite or expanded mica, mineral wool and glass wool, have been extensively used. The density with which all such materials is packed is a very important factor in their heat insulating value.

It will be recalled that materials possess heat insulating properties by virtue of dead air cells within the material. The smaller the dead air cells and the more there are of them and the less the possibility of any air circulation within the material that would permit transfer of heat from cell to cell, the better are the insulating properties of the material. Insulating value of materials is rated by a coefficient "K factor" or "conductivity." K factor of insulations ranges from .37 for the older materials to .17 for newer synthetic plastic materials just becoming available.

K factor or conductivity is defined as the amount of heat in B.t.u.'s per hour that will pass through 1 sq. ft. of material 1 in. thick with a temperature difference of 1° F. between the warmer and the cooler side. K factors for some common insulating materials are given in the accompanying table.

Now we have to go inside the house and talk about air circulation within the house itself. With slow natural circulation of warm air within the house, the warm air tends to mushroom against the ceiling, creating a high temperature with resulting high heat loss through the ceiling. With mechanical forced air circulation, it is possible to get temperature gradients between floor and ceiling as low as 2°, thereby minimizing ceiling losses. This, obviously, is one of the reasons for mechanical forced air circulation in many modern heating systems. No one will ever argue against the use of insulating material in the ceiling because it serves the dual purpose of retaining heat in the winter and excluding heat in the summer. This is equivalent simply to saying that any heat insulating material cuts down the rate of heat transfer, which after all is the thing strived for no matter how the problem is physically and mechanically approached, whether it be a problem of insulating a refrigerator or a house.

Quite naturally insulating an old house presents an entirely different problem from that of insulating a house while under construction. Common practice in insulating old houses is to blow in the material between the walls. Mineral wool is widely used and special tools and equipment are required. Johns-Manville and others have facilities for doing this type of work.

Heat loss from old houses that have been insulated by the blow-in or other method will naturally run higher than for well designed systems built in as a part of the house while under construction. However, insulation of old houses does pay, particularly where the insulation will serve to keep the house cooler in summer as well as warmer in winter.

It is not meant to imply by this discussion that a house to be heated electrically must be strange or radically different in any respect from one designed for some other form of heat, but it is intended to state in so many words that very careful consideration must be given to heat loss, if electric heating is develop along sound lines and be sufficiently competitive to build up any great amount of load for those distributing agencies interested in its promotion.

Insulating houses boils down in the final analysis to good sound logic. The electrical men cannot hope to become an expert in this field, but he should be thoroughly familiar with principles and methods and must see that architects and builders provide properly for heat conservation if electric heating is to be used. There is no shortcut method of getting more than 3,412 B.t.u.'s out of a kilowatt-hour. B.t.u.'s blown out of the house by air infiltration or drafts or that escape by conduction and radiation through walls, doors and windows are paid for by the customer and can exert a profound influence over his heating bill. Electrical men can to a large degree steer their own destiny in developing electric house heating load by the degree of control they exert over the type of house that is to be built in the future.

Phoenix Dealers Quizzed on Sales Plan

Outline of utility's ideas for promotional cooperative program presented in booklet at meeting and dealers' opinions are asked

"LET'S BE READY" was put into real action when dealers of Phoenix and the Central Arizona Light and Power Co. sat down together to review the type of promotional program they had conducted in days just before the war and to decide whether to do more of it, make any changes in it or continue it as it was. "Let's be ready" was the spirit in which the meeting was held. Its accomplishment made both dealers and the power company still more ready than they had been.

In order to be specific and thus save time, prior to the meeting the company had prepared a concise booklet with that same title. It recalled to dealers the things the company had done before, outlined its thinking as to a possible future program, and then asked the dealer who received it specific questions as to his opinions and preferences.

Included were some total figures of the market for appliances as appraised from a system-wide survey conducted by Ruth D. Kruger, director of the home service department. Thus it was both a measure of the potential market for all dealers, as well as a questionnaire as to their wishes and opinions.

Milton Sanders, general sales manager, prefaced the meeting as he did the booklet, with a friendly statement of the company's purpose in getting together. "Now that the war is over we are trying to work out a united sales program that will be helpful to you and other gas and electric dealers when equipment is available again.

"Appliances may not be available next year or the next, but if we can combine our thinking and establish a few basic principles upon which to build our program, we can be ready when the time comes."

He explained that the company's previous program had worked to the advantage of the customer, the dealer and the company, but that next time an even better program was desired and. in starting to fashion it, the ideas and suggestions of dealers were wanted.

In emceeing the meeting, Sanders discussed the policy aspects, told of market possibilities and explained briefly what the company had been doing during the war: how its facilities to serve had increased and that a market was needed now to utilize these added gas and electric capacities.

The booklet told of Phoenix's phenomenal growth, its increase of population from 186,000 in 1940 to 250,000 in 1945; in bank deposits from $42,266,338 in 1940 to $174,591,460 in 1945 and that series B war bonds now held for purchasing power totaled $44,412,890. Of the 13,600 renters interviewed, 4,080 had said they wanted to buy new homes, 3,060 wished to build, 4,080 to remodel. There had been more than 7,000 privately financed homes built since 1942. Of the 30,000 homes interviewed, 91% of the newcomers had said they wished to remain in Phoenix and vicinity.

To refresh their minds, dealers were also told of the dollar volume of gas and electric appliance sales in the area in 1935 ($1,163,698) and in 1940 ($1,626,762). With this increased population and the universal need for replacement of appliances the figures for 194x could only be dreamed about. Yet the 30,000 people surveyed had said that the things they want to buy as soon as available rated in the following order: 27% said automobiles would be among the first, 24% said refrigerators, 23% ranges, 21% said rugs, 20% washers, and others in lesser numbers. In all, the estimated value of appliances desired totaled $4,636,800, compared to the total of all other competitive items of only $13,915,000.

Miss Kruger explained the work of the home service department in keeping dealers' customers contented during trying war years. Reg Phillips, in charge of the residential sales department, told of the proposed united selling plan. He explained that the company does not intend to engage in appliance merchandising; will only carry but not display lamps and fuses as sheer customer accommodation. In the remote case that an appliance or service unknown to the public does require special promotion to develop public acceptance, there may be a possibility that the company will sell direct only long enough to build up a market for dealers.

C. T. Yates, head of the commercial and industrial sales department, told of the engineering services available to contractors and dealers at no cost. Don Willis, manager of advertising and promotion, described current advertising and future dealer-utility advertising. He had prepared the attractive booklet which all dealers were given as they entered the meeting.

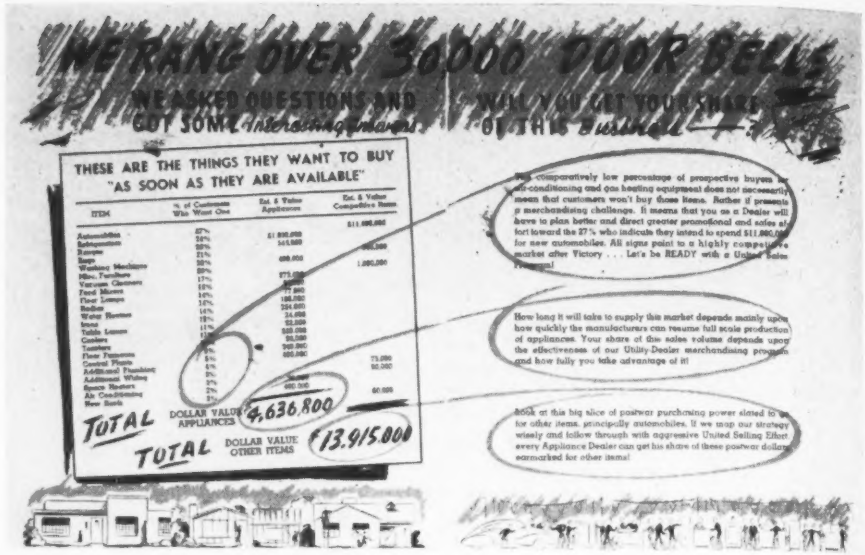
The last two pages of the booklet were a place for dealers to register their opinions. It contained place for their name, address, etc., and type of business. Answers to some of the questions are of particular interest.

Asked if they participated in previous utility-dealer sales plans before the war, 57% said yes, 37% no. Dealers intending to handle electric appliances were 85%, gas appliances, too, 78% of the total. Of the group, 76% intend to hire more salesmen, 6% not; 70% plan to give their salesmen special sales training, 5% not; 67% want, 11% do not want utility help in such training.

An observation from the meeting was that a majority of the dealers were not too well convinced that sales training would help and expected to hire salesmen who already knew the score.

Large crowd of dealers and their salesmen told Arizona Light & Power Co. men of their preferences and ideas

What the survey of 30,000 customers revealed as to buying preferences was shown graphically in booklet like this


WE RANG OVER 30,000 DOOR BELLS
WE ASKED QUESTIONS AND
THESE ARE THE THINGS THEY WANT TO BUY
"AS SOON AS THEY ARE AVAILABLE"
TOTAL DOLLAR VALUE APPLIANCES 4,636,800
TOTAL DOLLAR VALUE OTHER ITEMS 13,915,800

Most of them felt that showing of a film, attending a lecture or some other quickie training would be sufficient. The idea of a two-or-three-week course was somewhat appalling to most.

Dealers maintaining an installation department were 72% of the total. 19% did not; 72% planned to continue, 12% did not; 87% had a service department, 11% none; 62% had it for electric appliances, 57% for gas; 80% would do service work in the home, 12% not; 86% serviced equipment brought in, 8% did not; 86% said they would service equipment sold by others, 21% said not.

All liked the company's tentative plan for providing dealers with qualified prospect lists during specific campaigns; 78% preferred such a list to be given the dealer sales manager, 8% direct to the appliance salesman. Asked if they would like a monthly bulletin reporting total appliances sold by all dealers, 88% said they would, 3% not; 81% said they were willing to make a confidential sales report each month for such a bulletin, and only 6% said not; 9% objected to having their names as appliance dealers included in a mailing list given to factory and distributor representatives.

In regard to the services contemplated by the company to aid dealers, 78% felt that engineering service to help sell heating, air conditioning and lighting would be fine, 6% said no. As to home service, the dealers felt that the most important job that could be done would be to follow up sales (48%), demonstrate at home the uses of gas and electric appliances (43%), carry on demonstrations on the utility sales floor (45%), conduct cooking schools (48%), carry on home show promotion (37%).

Forty per cent of the dealers planned to finance their own paper, 40% to have it financed by banks and others. Dealers used advertising in these ratios: Newspaper 51%, radio 24%, mail 9%, outdoor 5%. They advised the company to use in its dealer-utility campaigns the following: Outdoor 26%, direct mail 48%, radio 75%, window displays 36%, newspaper 81%. There were no requests for point-of-sale posters, street car cards or novelties, but truck banners were wanted by 24%. In their own ads, 88% planned to feature low-cost gas and electricity, 6% did not, and 80% favored the use of a cartoon character, 18% did not, and 67% felt it would be of use to them in their own ads, 17% did not.

In company ads, dealers favored a signature "sold at your favorite store" (49%) over the listing of all dealers (33%.) Asked what promotional material the company could make available, 35% said displays and 5% said direct mail. Dealers wishing to display on utility sales floors numbered 80% of the group.

The prospect distribution plan submitted to dealers was that the company will establish territories with a salesman and home service advisor in each who will maintain continuous up-to-date market analysis and thus develop prospects. Part of the compensation of company representatives will be based on the appliances sold by dealers in their districts.

Salesmen's training offered was unusual. Dealers were to be invited to send their salesmen to a two-month schooling, during which time the company would pay part of the student's salary. Even with such an inducement, dealers seemed inclined to hope that so much sales training would not be necessary.

Results of the entire program, with this testing by dealer opinion, should be good, Milton Sanders felt. "I think our final plan will be one that nearly all of the delares will like very well."

Distributor

A new addition to the family of San Diego electrical appliance distributors is the Washing Machine Parts Co. of Los Angeles, which established a San Diego branch at 1743 India St. on Aug. 15. Under the managership of A. Van Wagner, with Claude Cline as service manager, the opening of the wholesale washing machine parts warehouse marks the first move to bring washing machine parts and supplies of all makes to San Diego. Prior to the awarding of the Easy Washing Machine parts franchise some months ago to Cole Appliance Sales & Service at 3020 University Ave., washer parts could be obtained only through Los Angeles. This is only one of several moves on the part of distributors during the past several years to locate branch outlets in San Diego.

Reddy Goes to Hollywood

Reddy Kilowatt, who seems to be everywhere in the West, will soon make a new all-star appearance from Hollywood as a movie actor in a novel and clever story which dramatizes the story of electricity. Fred W. Holz, Jr., general manager of the Reddy Kilowatt Service, just returned east from a trip which led to Hollywood where he previewed the black and white preliminary tests of what will be a ten-minute technicolor and sound cartoon production starring Reddy.

At a cost of $60,000, and requiring some 18,000 individual drawings, the Walter Lantz Productions, of Hollywood, (a division of Universal) hopes to finish the picture by the end of October. Special music and a clever Reddy Kilowatt song have been prepared by Music Director Calker and Del Porter. Walter Tetley, the "LeRoy" on the Gildersleeve program, has created a voice for Reddy.

The film will be available for distribution about the first of the year, Holz said, in either 16 or 35 millimeter size. It will run about ten minutes. Because it is non-commercial and entirely educational, its use in schools, clubs, churches as well as theaters is anticipated. Besides handling the history of electricity in a good humored way, it illustrates its distribution from today's generating station over transmission lines, through substations and into the Reddybox from which the user may always plug in and find Reddy.

B. C. Booklet Tells Dealers Sales Plan

Concise facts, well illustrated, present picture of market and outline company selling policies

ANTICIPATING the return of electrical appliances, B. C. Electric Railway Co. has released a comprehensive, pocket-sized booklet detailing its merchandising policy and dealer cooperative plan. Prepared under direction of W. C. Mainwaring, vice-president in charge of general sales, the booklet presents in attractive format the company's program as it affects electric and gas appliance dealers in British Columbia and gives supplementary information with regard to plant construction plans and potential appliance markets.

B. C. Electric in 1938 started to drop direct sales of appliances, discontinuing such lines as washers, ironers, cleaners. Now it plans to discontinue sale of table appliances, including irons, toasters and percolators, as well as floor and table lamps.

Through its own stores, it will continue to sell electric and gas ranges, ovens, rangettes, water heaters, refrigerators, heating equipment other than portable models and commercial and industrial equipment. The only other items handled by the company will be lamp bulbs, electric water systems in rural areas and newly developed equipment for which customer acceptance must be built.

An extensive market survey to determine needs of its residential electric and gas users is being carried on by the company and information from this survey will be made available to the trade toward the end of the year.

The company has already determined that there is a vast market in its territory for electrical appliances. It points out that there are 110,000 customers on its lines in the lower mainland area and 23,500 customers on its lines on Vancouver Island who do not have an electric ironer at the present time; 98,000 mainland customers and 21,000 on Vancouver Island are not now using a gas or electric water heater; 85,000 mainland customers and 18,000 on Vancouver Island are at present without an electric refrigerator; 58,000 mainland customers and 18,000 island customers have not as yet purchased a gas or electric range; 50,000 on the mainland and 10,000 on Vancouver Island are without an electric washer and 40,000 on the mainland and 9,000 on the island as yet have not bought an electric cleaner. In addition to this vast potential market, the company estimates that at least 25% of electric ranges and 50% of gas ranges now in service in the territory are obsolete and should be replaced.

In announcing its new cooperative plan, B. C. Electric offers an advertising allowance on appliance sales. In the case of all electric and gas ranges and storage automatic heaters, the company will pay to the dealer an allowance of $3 per unit. On electric farm equipment sold, the advertising allowance will be ½ of 1% of reported sales volume. These bonuses will be paid monthly on receipt of a regular report from the dealer on a form drafted by the company. Dealers are asked to make a complete report of their sales by the tenth of each month and the over-all market figures compiled by these reports will be made available to all.

Owing to lack of information from manufacturers, the company is not yet able to give complete details of its sales and promotional plans in connection with various appliances but it has set up skeleton outlines, details of which will be filled in later. To promote electric and gas water heater sales, for example, the company plans to discontinue its rental plan and states that in future automatic water heaters will be sold by dealers and plumbers as well as by the company. A bonus plan will be established for plumbers who do not wish to handle merchandising sales themselves.

To encourage use of modern electric and gas ranges, the company will resume the trade-in allowance formerly offered through dealers. The plan applies on new range purchases only, and the range turned in must have been in service on the company's lines for at least 12 months prior to the sale. Under the plan, the dealer extends an allowance determined by schedule, the amount being returned to him by the company upon delivery of the old range, which will be destroyed. Provision will be made to take care of apartment house replacement ranges where the new ranges are sold through a dealer. Introduction of this trade-in plan will depend on the supply of ranges, and replacement promotion will not be started by the company until requirements of customers not now using electric or gas ranges have been met.

Refresher and sales training courses will be conducted by the company for dealer personnel, covering basic sales training and general industry information. In response to dealer requests for assistance with window and store displays, this service will be given.

Company promotion will cover all appliances, even those not sold directly and will include displays, appliance shows, cooking schools and home makers' courses. From time to time, the company will display appliances which it does not sell directly and prospects or leads secured will be referred back to the manufacturer or distributor for allocation to dealers.

The company has recently reorganized its entire sales, light and power departments. John H. Taylor heads the division of dealer development, with H. R. Stewart and J. F. Skelton as dealer development representatives. These officials will be supported by the directors and managers and staff of the home service department, the light and power sales division, lighting and residential services, home lighting division, industrial development division, gas sales division, and gas sales repair department. In line with its policy to gradually retire entirely from the sale of electric appliances, B. C. Electric has sold its Granville St. store. It has the right however to use of the building for three years.

The home service department will concentrate on the instruction of owners of appliances particularly ranges, refrigerators and ironers. A free kitchen planning service will be maintained by the company and made available to all customers. The home lighting advisory service will be expanded and dealers will have the benefit of this assistance in connection with commercial and industrial installations. The company is re-establishing a staff of trained agriculturalists who will be attached to its rural office to assist in the development of rural electrification.

B. C. Electric will maintain its own appliance repair department and will service all appliances on which the company has continued direct sales. It will also, for a limited time, service appliances, the direct sale of which it has discontinued. Requests for service on appliances not sold by the company wherever possible will be referred back to the dealer who sold the appliance.

Dealers — Roll Your Own Planning — VIII

Another case study of one who has planned

ALTHOUGH Russia has boasted of a couple of five-year plans, Clare Kemp, of San Mateo, being an individual with lots of initiative and imagination, just plans continuously and, what is more to the point, makes the plans materialize. When war came along, he foresaw that many dealers would close up for the duration, so he planned to buy all their merchandise and also handle all the service that people of the community needed. Result was that he actually expanded and has a prospect list of about 5,000.

Not waiting until merchandise is available, Kemp has already started his big postwar expansion, planned many months ago. In the upper picture at left, Clare Kemp shows his new building plan to D. J. O'Brien, of Pacific Gas and Electric. It will occupy the corner where his gas station now stands and run back to the property he bought, an old house (see bottom picture) which was demolished to make way for the new three-story office, apartment and store building. (Quite a sensation was caused when a treasure cache of several thousands dollars was found buried in its walls.)

Another source of prospects has been a "roll your own" laundry service, which has been a lifesaver to the women of San Mateo. Two Bendix washers, the last in stock, were set up to operate. The use of them, on a rental basis at 50 cents an hour, has netted from $5 to $8 a day, besides furnishing a fine list of prospects for washing machines.

User of an all-electric kitchen himself, Kemp is thoroughly sold on it and plans to install several in the two stores he has in mind. For he intends to keep his present location as a showroom or showcase in which to display more appliances. In it will be shown the table appliances and some of the major units. The tire recapping plant now at its rear (shown at left) will be moved elsewhere and model electric kitchens installed there. This store will provide 1,500 sq. ft. of appliance display besides that in the main store in the new building across the street (which, by the way, will have a floor of apartments with electric kitchens).

Radio will have a separate store by itself in Kemp's present plans, where radio and television receivers and records will be sold, connected through an archway.

His belief in the full line for electricity was justified during his war experience. He bought all the disposals and electric dishwashers both General Electric and Hotpoint had remaining in stock and all the clothes dryers and electric blankets. As a result, he had stock when no one else in the country did, and received orders for these appliances from as far as Washington, D. C. When they become available again, he intends to do a big business in them.

Electric ranges and water heaters, too, he believes in. He made his store the source of supply for the whole region, even advertising and selling them in San Francisco from his San Mateo store. Considering the longer life and safety of electric water heaters, Kemp feels that these superior qualities can be sold. On sun-lamps, too, he stocked up and when the supply ran low, rented as many as 40 during the winter months.

Study Load Building

Washington Water Power men discuss policy

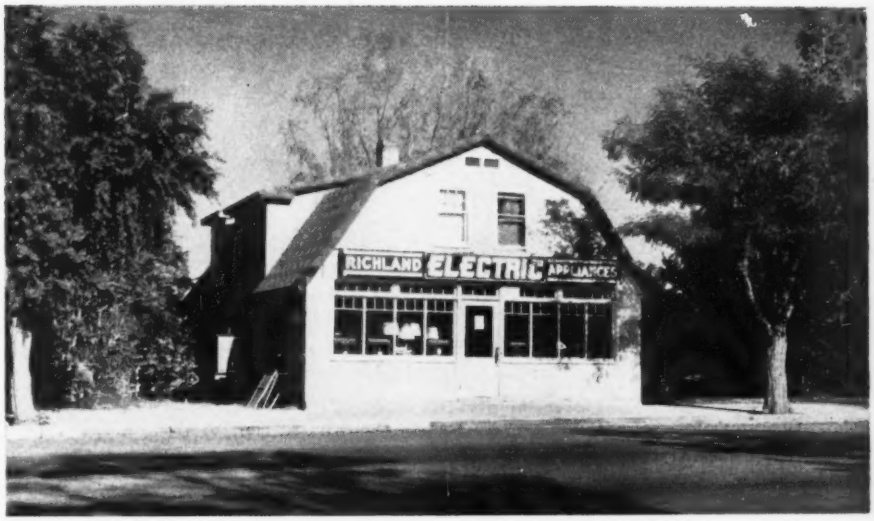
WASHINGTON Water Power officers responsible for planning met as a group recently to take a serious look at the problem of load building. The meeting, presided over by Asst. Gen. Mgr. W. L. Thrailkill, made progress toward determining future company merchandising policies and did much to bring division managers, sales managers and the general staff into agreement regarding this problem.

Whether or not the company should actively merchandise was the paramount question under discussion, and such aspects as curtailed merchandise, encouragement to small businesses, public relations, possible trends in company revenue were considered.

Other questions up for discussion pertained to company advertising, whether use copy or institutional copy should have precedent; sales training courses which could be made available for dealer employees; expansion of the home service department; company participation in the repair of appliances.

Division and sales managers were given an opportunity by Thrailkill to comment and express personal reaction to each problem. Also of interest throughout the discussion period were comments which had been gathered by R. B. McElroy and his dealer coordination staff from all dealers in the Inland Empire regarding postwar merchandising. Dealers in the Inland Empire, as over the nation as a whole, are divided in opinion as to whether or not the utility should merchandise. However, a considerable number of dealers believe that with a scarcity of merchandise in the next year or two, and with a strong demand for electrical merchandise on the part of the consumer, the actual sale of goods by the utility in immediate months will not be necessary. Company officials were of the general opinion that the company will postpone merchandising activities until such time as the dealers can benefit from the company's merchandising assistance.

● The Firm Of Bandoli-McIntyre Co., wholesale appliance distributors, has been formed at Los Angeles by Marvin S. Bandoli, Chicago, and Vincent J. McIntyre, New York. James A. Bertha, Houston, and Arnt Olson, Eau Claire, Wis., will serve as limited partners. McIntrye is active head of the business. He has been with Kelvinator in various capacities, including sales director for the laundry equipment division and general sales manager of refrigeration; with Montgomery Ward in charge of electric refrigeration; and with Dictograph Products Inc. as vice-president in charge of sales. Bandoli was with Nash-Kelvinator and later was vice-president in charge of distribution for Victor Adding Machine Co. Bertha has been in the appliance field for many years and Olson operates his own business.



Richland Electric enjoyed a government monopoly in the atom bomb plant town, for it was the only electrical dealer concessioned to operate. It is nice work if you can get it, Ken Wilson, proprietor, said, if you can get merchandise to sell. But it doesn't permit others to try their hand in business even if they want to

Better Light Package

Lamp bulbs are something that is available. Many a lamp socket is empty for want of a bulb. This combination started the dealers of San Diego County on their first cooperative selling campaign during November, aided by the sales promotion of the San Diego Gas & Electric Co., said E. W. Meise, merchandise manager of this now non-merchandising utility.

A compact "Better Light" package containing three 60-watt, two 100-watt and one 150-watt lamp, selling at straight list price but in a convenient package, was to be featured by all dealers in town. There was to be no premium. The lamps total 88 cents and will be sold at that price. Three lamp companies, General Electric, Sylvania and Westinghouse, have packages of lamps available to dealers through regular channels. Each likewise has sales helps and display material.

Pre-campaign advertising was run in late October in all media. Showcards were provided dealers also for store and window display. The advertising was directed at setting the 100-watt lamp as the measure for the public. A survey conducted among customers by the utility had revealed that about 75% of the public thought it cost much more than it actually did to burn a 100-watt lamp.

Electric Center

While most of the planners are just getting into low gear, Goldwaters, of Phoenix is all ready with a new "Electric Center" into which appliances can move the minute they come off production lines. They did their planning a long time ago and today are ready to merchandise from the handsome new corner edifice at the corner of Central and McKinley streets. It was timed to start construction immediately following the end of war in Europe.

A spectacular corner display window, 24x18 ft., will frame an elaborate turntable for merchandise display. Along one side of the building will be four model kitchens, each equipped for full operation. Photo-cells will open doors for customers. There will be five display rooms in which the latest in radios, radio-phonographs and television sets will be demonstrated.

A number of subsidiary departments will carry luggage, gift and some furniture lines, although duplications between the main store and the separate Electric Center will be avoided, according to Bob and Barry Goldwater, proprietors.

To take all possible embarrassment or discomfort from credit arrangements, a "credit den" of homey type will be set up where those seeking terms will receive individual attention in privacy and comfort rather than having to stand before barred credit windows.

Appliance Front Prepares for Action

Distributors organize staffs, manufacturers start shows, big appliance stores building, dealer news

Rolling off the production line at the Ontario, Calif. plant of General Electric

● UNIFORM, NATIONALLY ADVERTISED prices for Edison General Electric (Hotpoint) Appliance Co. lines may result in lower prices than prewar in the West, which formerly carried freight atop the factory price. Now the appliances will be uniformly priced for sale anywhere in the entire country including delivery and federal taxes. Previously 1942 prices were announced for ranges and water heaters. Wiring allowance cannot be included in nationally advertised prices, however.

● MARK YOUR CALENDAR now for the *Western Spring Market*, in San Francisco, at Western Merchandise Mart, Feb. 4-9, 1946. The appliance floors will come back into being. The Mart has plans all ready to start construction of a big addition, extending the present structure to fill the entire block on Market street and to the alley on Ninth.

● ASSOCIATED POT & KETTLE CLUBS again will publish a *National Housewares Directory* in January for the first time since the 12-year record was interrupted by war, Harry O. Davis, Los Angeles, national president, has announced.

● SHAVERS BY SHICK will soon appear, the first big allotment to the West Coast and Rocky Mountain regions having been made by the factory. They will reach stores in time for Christmas sales.

● FRIGIDAIRE hasn't resumed its spectacular dealer showings but it did hold a string of distributors' meetings throughout the West early in October. R. G. Hutchison, Pacific regional manager, Oakland, accompanied by S. W. Beecher, assistant regional manager, and A. G. Foote, commercial and air conditioning manager, and W. H. Baldwin, conducted the meetings in Oakland, Portland, Seattle and Spokane with local distributors. In Oakland distribution is through the factory branch there. In Portland and Seattle the meeting was with the staff of Sunset Electric Co.; in Spokane with Jensen-Byrd Co. Another group of meetings was held in Salt Lake City, with the W. H. Bintz Co., and El Paso, the W. G. Walz Co., and at Los Angeles with the factory branch staff there. Another meeting scheduled for Billings, Mont., was called off at the request of Northwestern Auto Supply Co., distributors there, on account of a polio epidemic. The program, partly carried by the traveling executives and partly by local men, discussed the company's prospects for the future, discussed the lines to be made and their features but could not predict prices because of many undecided factors. The new Frigidaire range is now on the market and Frigidaire had stock enough to release refrigerators throughout the country when the government freeze was lifted Oct. 15. A national pricing plan has also been announced which may make Western prices lower if the same top prices are retained, for the factory will absorb freight charges in order to print a uniform price on the label inside each box.

Don Belding, advertising executive, and R. G. Hutchison, manager, Pacific Coast Regional office, look over the new Frigidaire now in mass production

● THOR WASHERS AND IRONERS and the ingenious new combination washer for either dishes or clothes may be assembled in Los Angeles. The Hurley Machine Co. has recently bought ten acres of land at El Monte, Calif., on which to erect an assembly plant, it is reported.

● J. E. KEARNS, former supervisor of appliance and dealer sales for Southern Counties Gas Co., Los Angeles, has joined Ralph L. Stowers, dealer and distributor, of 71 N. Raymond St., Pasadena, and they have the appliance concession for all of the Broadway Department Stores in the region, including a new store contemplated exclusively for appliances. They will have Western appliance distribution for Glenwood stoves and heating appliances, Southwestern distribution for Servel for liquid petroleum gas and for Coleman appliances.

● MOUNTAIN STATES DISTRIBUTING Co., Salt Lake City, has been named Utah and Idaho distributor for Lear home radios and wire recorder. E. E. Pritchett is president of Mountain States. PARKER-MONTANA Co., Billings, Ulys C. Clark, manager, has been signed in Montana. Parker-Nevada is an associate of the Parker Co. of Denver, which covers Colorado and Wyoming.

● LEAR INC. recently named new distributors in Washington, California and Nevada. Stusser Electric Co., Seattle, will handle the company's line of home radios in Washington; Dalco Appliance Co., division of the Dallman Supply Co. of San Francisco, Sacramento and Fresno, will be the distributor in northern California and Nevada.

● BARMAN'S department store at Colville, Wash., is to spend $15,000 in remodeling a three-story building which it has acquired in addition to its present Barman Bldg. In the remodeling space will be housed the electric appliance and radio departments in addition to hardware and furniture. Louis Strauss is the manager.

● SUBJECT to approval of its stockholders, General Electric Co. was to acquire the business of Electric Vacuum Cleaner Co. on Oct. 31. The Premier division of Electric Vacuum Cleaner would become a sales division of G-E appliance and merchandise department.

● J. L. HARGROVE has been elected vice-president of Kinney Bros., Los Angeles distributor of household appliances. He is general sales manager of the firm, which distributes major and table appliances throughout southern and central California.

● GENE KEHR has been appointed official San Diego and Imperial County representative for Kinney Brothers, Los Angeles distributors. He will handle distribution sales of Stewart-Warner radios, Miracle and Arvin table appliances and heaters, and McAllister vacuum cleaners, in addition to the new Aviation Corp. refrigerators and ranges. A warehouse and display room will be established, together with an office and sales staff which will handle business for San Diego and Imperial counties, and parts of Arizona. For eight years Kehr has been traffic appliance manager for the Electric Supplies Distributing Co. of San Diego. He reports that franchising of Stewart-Warner dealers has been nearly completed for the San Diego territory.

● WILLIAM A. DERIDDER has been elected president and general manager of Adel Precision Products Corp., Burbank, which plans to manufacture appliances after the war. He succeeds Ray Ellinwood, who recently resigned.

● LYNN AND CHEMNITZ, wholesale distributors of appliances and housewares with headquarters in San Francisco's Merchandise Mart, have opened a Seattle branch office at 6222 First Ave., N.W. Earle E. Eckstrom will head the new office as Seattle manager. The company, which is owned by Wallace R. Lynn and Eric Chemnitz, earlier this year opened a Los Angeles branch at 316 Commercial St., with Harvard H. Hill as manager. Among lines represented are Barlow & Seelig Mfg. Co., Speed Queen washers and ironers; Victor Electric Products Inc., force air exhaust fans; Superior Electric Products Corp., small electrical appliances.

● W. E. WHITE Co. has been opened by Ed White, former manager of G. A. Lowe Co. retail store, Ogden, as a new electric appliance store. White is a past president of the Ogden branch of Electrical League of Utah.

● SENTINEL RADIO CORP. has announced new distributors in the West, including: Northwest Supply Co., Great Falls, and Missoula Drug Co., Missoula, Mont.; North Coast Electric, Seattle and Portland; Northwest Radio Supply and Gilbert Brothers, Portland; Biggs-Kurtz Hardware Co., Grand Junction, Colo.; Davis Brothers and Inter-State Radio & Supply, Denver; Smith-Faus Drug, Salt Lake City; Afton-Lemp Electric, Boise, Billmeyer's, Pocatello, Idaho.

● HARPER-MEGGEE INC., distributors for the Bendix home laundry, sponsored the first presentation in Spokane of a major appliance for the home when about 50 Bendix dealers met in the new quarters of the firm at N. 734 Division St. recently. N. E. Schuman, district sales manager of Bendix Home Appliances of South Bend, Ind., was present. L. G. Albert, general manager of Harper-Meggee, was chairman of the meeting, which was also addressed by Gene Gollihur, Bendix sales manager of Harper-Meggee Inc.

● LOVE ELECTRIC Co., electric wholesaler in Tacoma, is opening a branch for merchandise only, at 325 Westlake North, Seattle. E. D. Tammel, formerly of Harper-Meggee Co., will be manager of the branch.

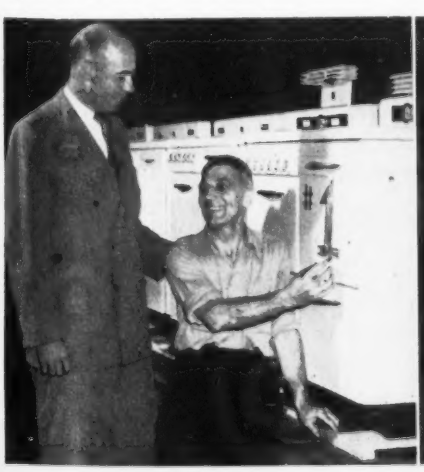
● NELSON R. THOMAS Agency, Inc., Pacific Coast distributors, opened an office recently in the Western Merchandise Mart in San Francisco, with R. W. Tull manager. Lines handled are Sonora Products of Chicago, radio combinations and records; Verd-A-Ray Corp. and Penetray Corp. of Toledo, makers of incandescent lamp and infrared heat lamps, respectively, as well as other non-electric lines.

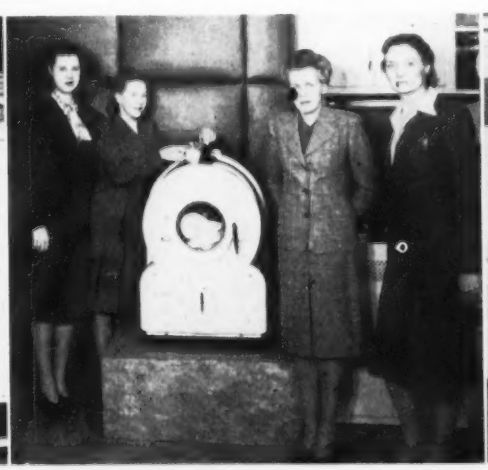
● FRED C. WOOD Co. has been appointed factory representative in northern California and Nevada for A. E. Dormeyer Co., Chicago, makers of electric mixers. Offices are at Merchandise Mart, San Francisco.

● W. A. FRIEDRICH, former Westerner, has been appointed sales director of the home appliance division, Hamilton Mfg. Co., at Two Rivers, Wis. He was a Pacific Coast representative for the Charles Bruning Co. when he joined Hamilton in 1939 as field representative in California.

● BLAINE R. LIND has come to San Francisco to fill the vacancy at Graybar made by the resignation of CLYDE ALLEN, merchandise manager. Lind had a similar position in the Seattle Graybar house. Allen has not yet announced his new connection.

Ward Schafer, recently of the Coast, now Hotpoint vice-president (below) watches first range made since 1942 reach the end of the line. Center: Francis Alexander and Mary Jane Farris of Harper-Meggee, Inc., Portland and Spokane; Edwina Nolan, director of Bendix home laundry institute and Marguerite Sorenson, Harper-Meggee, Seattle, during home economists conference recently. Right: George Porter, manager, San Diego branch, Gough Industries, stands beside first L & H range and water heater to arrive in California since resumption of production





Recommended Practices for School Wiring

Prepared by the Technical Subcommittee of the Wiring Section of the Northern California Electrical Bureau in cooperation with the Division of Schoolhouse Planning, State Department of Education

ELECTRICAL facilities perform such an important function in the operation of modern schools and in the education of students that these Recommended Practices for Wiring California Schools are offered as a guide to insure adequacy of the electrical wiring system in the many new schools that will be erected following termination of the war. It is hoped hereby to stimulate a greater interest in the electrical wiring system that will go into these new schools to assure their proper functioning and to avoid the necessity of expensive wiring changes at some later date.

These recommended practices are in no way specifications nor wiring layouts. They are intended to serve merely as basic minimum wiring standards for guidance of engineers and architects who will design the schools of the future. Such recommendations as are herein contained are made with a full appreciation of the element of cost involved. Good practice and sound judgment have motivated each suggestion made. Rather than cause any increase in cost, it is believed that if suggested practices be followed in their *entirety*, over-all cost of the wiring job will actually be less than with many of the wiring systems installed in the past.

Types of Schools

There are several types of schools from elementary to college and varied sized buildings for each educational level and the electrical requirements vary so widely that it would be impracticable in a treatment of this kind to cover each separately. A study of academic classroom functions reveals little difference from the elementary school on up to the college insofar as electrical wiring requirements are concerned. Therefore, it will first be the purpose of this wiring guide to take up present and future electrical applications in classrooms, and to recommend certain minimum wiring practices therefor. Electrical uses in classrooms, present and future, have been thoroughly studied, and the recommendations that follow are believed to provide adequately for future requirements.

Classroom Lighting

Most basic of classroom requirements is proper lighting. Experience has shown that even in sunny California, properly engineered artificial illumination is necessary for conservation of eyesight. Recommended practices for schoolhouse lighting are contained in a bulletin entitled *Recommended Practices for Lighting California Schools*, issued by the California State Department of Education, Division of Schoolhouse Planning, and may be had upon request.

Wiring Capacity for Classroom Lighting—Wiring capacity is recommended which will permit utilization of up to eight watts of lighting for each square foot of floor area. The figure of eight watts is predicated upon the following reasoning: The average totally indirect incandescent luminaire in the average classroom will provide approximately five foot-candles of maintained lighting intensity for each watt per square foot utilized. Eight watts per square foot will then provide roughly 40 foot-candles of intensity, which is accepted good present-day practice for indirect lighting.

Eight watts per square foot will provide adequately for the higher fluorescent lighting intensities rapidly coming into use when properly engineered, well-shielded fluorescent lighting is used. While techniques applying to lighting of school classrooms may undergo many changes, it is not probable that the efficiency of present light sources will improve radically for some time. Based, therefore, upon the foregoing reasoning, it is felt that wiring capacity for a lesser wattage than eight watts per square foot would prove a costly mistake.

Lighting Provisions—A sufficient number of outlets should be provided and sufficient circuit capacity installed so as to provide not less than eight watts per square foot for lighting.

Wire Size—Under no consideration should wire smaller than No. 12 be used. Very careful engineering consideration should be given to determination of wire size so that voltage drop will not exceed 2% on 120-volt circuits. Maximum circuit length between panelboard and most distant outlet should not exceed 50 ft. when No. 12 wire is used. When circuit distances between panelboard and outlets exceed 50 ft., the size of wire shall be determined by calculating in accordance with the National Electrical Code.

Lighting Circuit Conduit Capacity—Conduit runs between ceiling outlets and wall switches may be as small as ½ in. if circuit arrangement permits, but the conduit run of "home run" which carries circuits to the panelboard or fuse cabinet, if it involves more than three No. 12 wires, should not be less than ¾ in.

It is of the most vital importance

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that ample conduit capacity or "raceway" capacity be provided at the time a schoolhouse building is erected. If liberal allowance is made for future expansion, it is a comparatively easy matter to increase size or number of wires at some later date. If, however, false economy has resulted in an initial conduit size just sufficient for the immediate requirements, it is a costly job later to attempt to increase size.

Plug Receptacles — Inadequacy of classroom wiring has been frequently manifested by lack of a sufficient number of plug receptacles. With audio visual educational equipment coming more and more into use and with what the postwar era promises in the way of new developments, it is essential that adequate plug receptacles be provided.

Number of Plug Receptacles—One duplex receptacle at the front and one at the rear of the room are recommended. These will handle projection and motion picture machines, radio and television equipment, cleaning equipment and other devices.

If provision is to be made for germicidal lamps to kill air borne bacteria, not less than four outlets should be provided for this purpose. These might be located on opposite walls of the room and at a height above the floor that will permit proper installation of equipment above the angle of vision. It is important that these lamps be located above the line of vision.

All of the before mentioned outlets are in addition to clock and other special outlets.

Plug Receptacle Wiring—Wire size shall be a minimum of No. 12, and shall be provided with overcurrent protection of not less than 20 amperes. A single plug circuit shall not supply more than three classrooms.

Corridor Circuits—Provision shall be made for proper corridor and stairway lighting. A sufficient number of outlets and sufficient circuit capacity should be installed to provide a minimum of two watts per square foot for lighting these areas.

In addition, it is recommended that a number of plug receptacles be provided for illuminated displays and for floor scrubbing and cleaning machines.

Panelboards

Having determined the necessary number of classroom, corridor, stairway and special utility (hot plates, etc.) circuits, it is then possible to determine the required number of circuits in the distribution panelboard. It is imperative that spare circuits be provided for future use. No less than 20% spare circuits is recommended, i.e., if the initial number of circuits should total 20, then a 24-circuit panelboard should be provided. It is recommended that spare conduits be stubbed up and down from panelboards to accessible open areas above and below cabinets. When the number of circuits in a panelboard is 16 or greater, said conduit should be not less than 1 in. in diameter.

Feeder Size

Feeder conductors supplying panelboards should be sufficient in size so that voltage drop will not exceed 1%, and the conduit for said feeders should be installed one standard size larger than that ordinarily required. This minimum provision applies only to elementary and high schools and must not be taken as a criterion for vocational and other schools with shops, laboratories, etc., where even greater expansibility should be provided.

Main Switchboards and Feeder Distribution Panels

It is recommended that the number of feeder switches as required for the initial installation be increased by not less than 20%, and in no event by a lesser number than two additional switches of a size to be determined by the designing engineer.

Main Service Conductors

In determining the size of conduit or raceway to carry the main service conductors from the transformer vault or power company pole to main switchboard, provision should be made for spare raceway capacity for future use either (1) by stubbing out spare conduits from the switchboard to an accessible location, or (2) where the required size of service conduit is greater than No. 4/0 a duplicate conduit of equivalent size may be installed for the entire length of the run. If sports lighting is not to be initially installed, it is recommended that an empty conduit be stubbed out from the switchboard to some convenient point outside the building for future use.

Where transformers supplying the school are housed in a vault, provision should be made in determining vault size to permit doubling transformer capacity at a later time.

Recommendations as to spare switchboard capacity, spare service conductor conduit capacity and vault size are particularly important. Case after case has arisen where it was desired to install a cafeteria, sports lighting, additional classrooms, gymnasium, shops or other load after a school has been in service for some time, only to be confronted with a very expensive rewiring job.

Types of Wiring Systems

There are two general types of wiring systems or kinds of circuits that may be employed in serving schools and other buildings. One is the 120-240-volt, three-wire single-phase system, and the other is the four-wire, three-phase, 120-208-volt system. The latter, which is now widely used for schools, office buildings, stores and factories, has the advantage of less voltage drop and a saving in copper of about 10% for a given load as against the three-wire system. Moreover, it has the further advantage that lighting and power service may be provided by one set of transformers, through one set of main service wires and through one meter.

Power companies are usually willing to supply this four-wire system, particularly where there is any appreciable three-phase motor load to be served. It is important, however, that the matter be taken up with the power company in advance because in some areas it is not available.

Where the four-wire system is available, the savings in copper and conduit size should by all means be carried clear through the wiring installation to and including the individual branch circuits, by making all circuits four-wire, 120-208 volts. Only in this way will full economies be realized. Where the four-wire system is used, it is necessary that heating devices, motors and other nominally rated 220-volt equipment be rated at 208 volts.

Savings effected by the four-wire system might easily offset any additional expense entailed by following these recommended practices as compared with past inadequate wiring installations.

Shops and Laboratories

Because of the many functions of shops and laboratories, it is impractical to attempt to make specific recommendations for wiring as has been done for elementary and high schools. Shops and laboratories evolve from the classroom. Hence classrooms are common to both types of school buildings and wiring requirements differ mainly only insofar as special purpose circuits are concerned. Therefore, the recommendations hereinbefore made for classrooms in elementary and high schools need be supplemented only by the special circuits required by the shops and laboratories. No attempt can be made to specify for these special circuits, excepting insofar as raceways are concerned.

Conduit runs for special circuits should be made of a size that will permit at least doubling the initial wire size at a later date.

Conduit runs for feeders between panelboards and main switchboard should likewise be of a size that will admit of later doubling of wire size. Feeder wire size should conform to the 1% voltage drop limitation.

Shop Lighting—If shop lighting is to be of a general character, wiring should conform to the same standards as recommended for elementary school classroom lighting. It would be impractical to cover within the scope of these recommended practices the many forms of special lighting installations called for in shops. If, however, lighting circuits are provided which will permit utilization of eight watts per square foot, the resulting wiring installations will provide ample flexibility in the layout of shop lighting systems.

Power Wiring — Design of power wiring systems for vocational schools is a problem that should be handled only by a competent engineer. It is suggested to engineers handling this phase of schoolhouse wiring that careful consideration be gvien to use of the bus-duct system now widely used in industrial plants. Only with such a system can any reasonable assurance be had against costly changes in power circuits at some later date. So many additions and rearrangements of machines and equipment take place in shops over a period of time that it is quite impossible to obviate expensive rewiring with any type of power wiring system short of the bus-duct type.

Home Making Rooms

It must be recognized that ranges and all such special appliances that consume considerable electric energy cannot be connected to the general wiring system and that depending on the number of such ranges and special appliances, particular and adequate provision with respect to wiring must be made therefor.

Electric Heating — Some California schools are electrically heated and consideration will want to be given to this method of heating. Since an electric heating system must be carefully engineered, it will be assumed for purposes of these recommended practices that adequate wiring facilities will be provided by the designing engineer if a school is to be completely electrically air-conditioned.

Main Switchboards and Distribution Centers

Space should be provided and provision made for increasing the size of the initial switchboard installation by not less than 20%. Conduit or raceway capacity between switchboard and transformer vault or outside riser pole should conform with recommendations made for elementary and high schools. Transformer vaults should be sufficiently large to permit doubling the initial transformer capacity at a later date.

Other Types of Schools

There are several other types of school buildings not specifically mentioned, such as junior high schools, junior colleges and colleges. However, the electrical facilities required for these schools will fall somewhere between the elementary school and the vocational school and recommendations for adequacy of wiring hereinbefore discussed will cover the basic principles that should be applied to wiring systems in these several other types of schoolhouse building.

Basic Philosophy

The potential contribution of electrical services to modern education practice is very great. This contribution, however, can be realized only when electrical current in adequate amounts is well distributed and controlled and provided with a maximum of flexibility to meet changing needs.

Contractors Meet

The first meeting of the Electrical Contractors Division of the Bureau of Radio and Electrical Appliances of San Diego County was held Sept. 21, in the fifth floor auditorium of the San Diego Gas & Electric Co. The 86 electrical contractors and jobbers were greeted by William Powell, past president of the bureau, who stressed the fact that, with the advent of many new appliances on the market in the years ahead, there is a need for a mutual understanding among the contractors themselves for a higher standard of wiring and electrical installations in new homes.

C. M. Thompson, lighting consultant for the San Diego utility, briefly outlined the services rendered customers by the company's lighting department. In addition to advice, suggestions, and recommendations given to both domestic and commercial lighting customers, Thompson explained that his department was providing an engineering service for commercial establishments to aid in their lighting problems. He stated that the lighting department will have men in the field to promote better lighting, which will naturally result in a great deal of business for the contractors. Thompson emphasized the importance of overcoming the obstacle of financing lighting improvements. He urged the contractors to employ finance systems which would make it easy for customers to purchase and pay for good lighting equipment.

Second speaker of the evening was P. P. Pine, power sales engineer for San Diego Gas & Electric, who pointed to the tremendous agricultural power potential and industrial power growth of the area. Pine told the contractors that they would find a new field for business among the new industries locating in San Diego and urged them to cooperate in every way possible with the Chamber of Commerce in encouraging new business to locate there. He also urged the contractors to keep abreast of the new industrial appliances and sell industries on the advantages of their application. In pointing to the large agricultural expansion anticipated in the county, Pine drew attention to the fact that it now ranks twenty-third in the nation in the value of farm crop produce. He stated that it is expected that 97% of all farms in California will have connections to high lines within five years and, with the more liberal extension policies planned by utilities, electrical contractors will find the rural communities a large market for new business. He urged the contractors to establish rural specialists in the field and cooperate whenever possible with farm groups.

E. W. Meise, superintendent of domestic electric sales for San Diego Gas & Electric, emphasized that the contractors should take advantage of the rich sales opportunities ahead by meeting together frequently so all would be telling the same story. Pointing to a recent domestic survey, Meise said that 95% of San Diego's homes had only two circuits and were found to be inadequately wired for prewar appliances, let alone for the appliance innovations ahead. He estimated that San Diego will build 20,000 new homes during the next five years, in addition to 8,000 homes which will be constructed under Title 6 of the FHA. Meise further estimated that 50,000 old homes will be completely rewired. He stated that financial institutions are ready to help finance good wiring.

The meeting was concluded with a talk on *Better Wiring for Better Living* by Elbert W. Kramer of the Westinghouse Electric Corp. and chairman of the Better Wiring Committee for the Pacific Coast Electric Assn. Jess Zweiner of the Zweiner Electric Co. was elected to the chairmanship of the organization and will represent the contractors on the board of directors of the bureau.

Germicidal units are mounted above the picture molding, about seven feet from the floor, above eye level. There are four to the average classroom, two on each side wall. Air of the room circulates through the unit and is sterilized as it passed close to the radiation

U-V Protection for an Entire School

Particularly necessary in the hospital or rest room where children are sent to rest if they feel ill or need first aid treatment, one unit is installed there

WHILE commercial offices and plants can be and are progressive and thus experiment with new equipment that promises benefit, naturally school boards and school officials must be cautious and conservative. Hence the introduction of a new aid to health into a school comes only after the equipment has been proved to be truly effective. It is for such reasons that the introduction of germicidal lamps for the protection of school children against air-borne bacteria has proceeded slowly. There has been little long-term experience, with records to back it up, from which the school officials could judge the efficacy of the equipment.

Besides, health is such a variable matter and so dependent upon a combination of factors, most of which the school itself has no control over, that the investment in germicidal lamp equipment cannot but be regarded as a doubtful one.

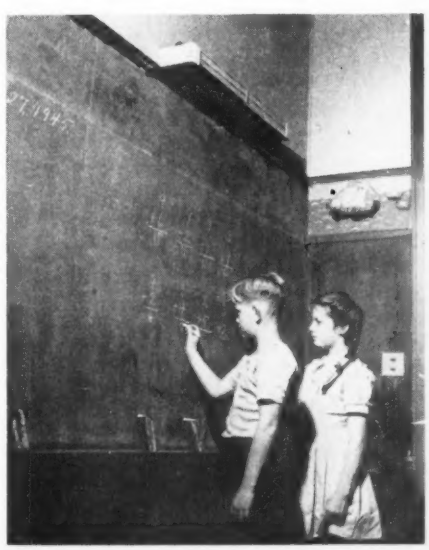
But someone has to try a thing or else it never will be known whether or not it works. The board of education at Burlingame, Calif., decided that it would make the test. To reassure it, there was the experience in industry, in offices and plants which, although not documented nor recorded on a truly scientific basis, gave promise of adequate results. Also there were data from three schools in Pennsylvania which had kept records of attendance, particularly through a measles epidemic, and these were very favorable to the use of germicidal lamps as a preventative of the spread of infection and epidemics.

The Coolidge elementary school at Burlingame was selected as the one in which the installation would be made. L. S. Oppenheim, lamp specialist for General Electric Supply Corp., San Francisco, designed the installation and Karl Mausser, Mausser Electric Co., Burlingame, assisted and made the installation. The school has an enrollment of approximately 164 students, consisting of six primary grades and a kindergarten. It was decided to make a complete installation, equipping each classroom and the hospital room, the library, and the school office room.

A total of 35 Rad-i-Air 30-watt units was installed. They were used in the proportion of one unit for each 150 sq. ft., which resulted in the use of four units for the average classroom. It is estimated that the effect of the radiation upon the air passing through each unit is the equivalent in sterilizing effect of changing the air 150 to 200 times per hour.

To provide the board of education and school people generally with as accurate data as possible for future determination of other installations, records of daily attendance will be kept and compared with those of previous years and in other similar schools. Thus the Bay region with its first germicidal equipped school as a measure, will seek the answer to improved school child health.

The units are inconspicuous, mounted just above the chalkboard as shown below. Baffles in the fixture prevent any direct or indirect radiation on children or into their usual line of vision



Electrical West—Vol. 95, No. 5

Some Things 1946 Code Will Contain

Returning members of Electrical Committee indicate what some decisions on controversial issues were at Chicago Code sessions

A BRIEF PREVIEW of what the 1946 edition of the National Electrical Code will contain is obtained from conversations with some of the Westerners who attended the significant Electrical Committee meeting in Chicago, Oct. 8-12. It was here, after five years, that the National Electrical Code was reviewed in its entirety and decisions reached as to what the next edition shall contain.

The Electrical Committee, numbering 50 voting members and 50 alternates, is made up of groups of representatives from various industry groups. Its work is to pass upon the proposed changes to the Code which come before the committee after being digested and prepared by the article committees. According to those who have attended such meetings, the process is democracy at work and results in the best compromise between conflicting interests that it would be possible to obtain. Any proposal of real merit, provided it is presented properly and soundly, wins support and any that is too selfish usually fails.

Seven Westerners from the Coast attended, either as accredited members of the Electrical Committe or alternates. They were: L. W. Going, chief electrical inspector, Portland, member, and W. L. Gaffney, chief inspector, Tacoma, alternate, representing the Northwestern Section, International Association of Electrical Inspectors; R. H. Manahan, retired, former chief, Los Angeles Electrical Division, member, and B. C. Hill, superintendent, electrical division, Oakland, alternate, representing the Southwestern Section, IAEI; George E. Kimball, electrical engineer, California Industrial Accident Commission, alternate, representing the International Association of Industrial Accident Boards & Commissions; Jarad A. Hill, Pacific Gas and Electric Co., San Francisco, alternate, electric light and power group; and Nicholas Siggins, electrical inspector, San Francisco, alternate, representing International Brotherhood of Electrical Workers. Two others, who could not attend, are: Ralph W. Wiley, chief, Department of Electricity, San Francisco, member, representing United States Conference of Mayors, and M. T. Crawford, Puget Sound Power & Light Co., Seattle, alternate, representing the electric light and power group.

While full details of the Code changes will be made public later, particularly in the preprint of the Code next spring, interest attaches to a number of subjects which received considerable discussion at the recent inspectors' meetings. Just what was done with them is what both inspectors and contractors would like to know in order to govern themselves accordingly in the interim between now and the time the Code appears, late next year.

A quick summary of some of these points and what was done about them:

Wire—The proposal to eliminate No. 8 and No. 10 and substitute No. 7 and No. 9 for them, lost out. This means that the old standard sizes will continue.

Circuit capacity—However, in order to simplify wire tables, what was eliminated was both the 25-amp. and the 35-amp. circuit. The range of circuits will now be: 15 amp. with No. 14 wire; 20 amp. with No. 12 wire; 30 amp. with No. 10 wire, and 50 amp. with No. 8 wire.

Multiple circuits—The 30- and 50-amp. circuits can be multiple service circuits, which means that more than one electric heater, for example, can be put on such a circuit. Previously each heater was required to have its own circuit.

Synthetic wire—Approval of synthetic wire for use in almost all places where Type R wire formerly was permitted, was voted after strong debate. The failure of some synthetic wires complained about in numerous meetings was considered to be a manufacturing failure which Underwriters' must try to police better. Improved quality was placed upon the manufacturers as a responsibility.

House insulation—A move to require that wires in residences where insulating fill is installed in the walls be required run in conduit, failed to win support.

Conduit fill—The 40% restriction on conduit fill for new work was retained, and so was the 50% allowance in rewiring. With the permitted use of wires of smaller diameter insulation, this will mean more capacity per given conduit size and requires conduit table revisions.

Range grounding — Grounding of the range frame to the neutral was passed over vigorous opposition. Experience of many Western utilities with this practice had a strong influence in its passage.

Multiple grounding — Likewise the grounding of the wiring system at every building of a group of buildings, such as at a farm, was approved. Experience in protection of cattle from grounded equipment in farm communities weighed heavily in favor of multiple grounds.

Non-metallic Sheathed Cable — Although efforts were made to outlaw this wiring material, it was retained as an approved wiring method after warm debate. Again farm experience counted heavily.

Type S Fuses—The type S fuse will again be made mandatory after the 1946 Code appears. By that time distribution of the fuses, hampered during wartime, is expected to be complete enough to insure the workability of this provision.

Hazardous Locations — The completely rewritten Article 500 on hazardous locations, as presented in the Article Committee Reports, was approved with minor modifications.

Guarded Trolleys—Whereas the interim amendments said that contact trolleys *should* be guarded in some manner, the new Code will say that they *shall* be guarded. Unprotected trolley wires on cranes and monorails have been the cause of a great many fatalities and accidents.

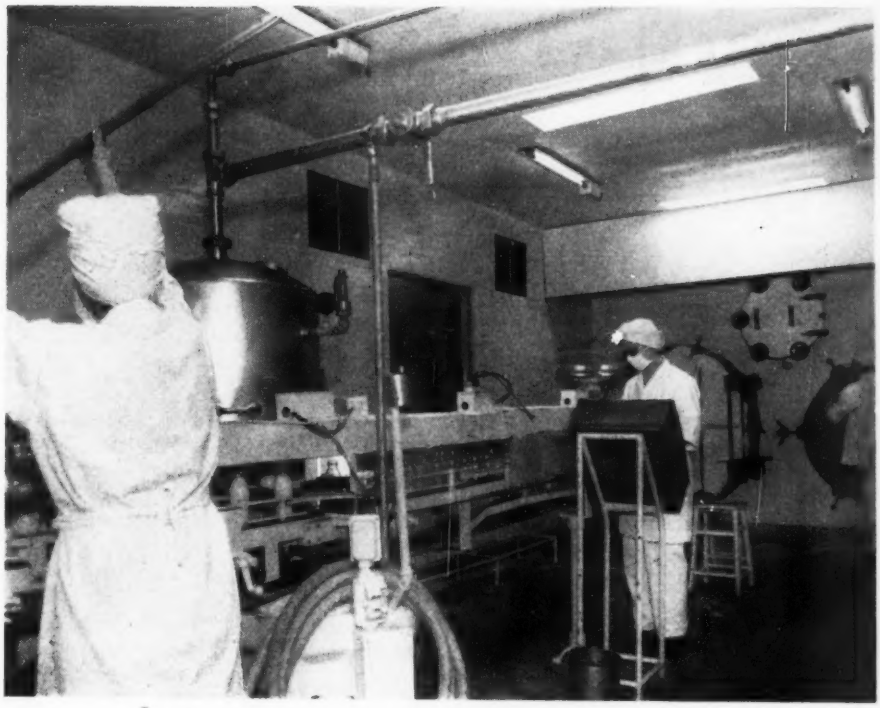
Three-phase protection—Both motor running and circuit protection on all three phases of three-phase motor installations was finally approved. This has been sought by the electrical industry in the West, where three-phase is supplied to the farming industry and where accidental single-phasing has caused extensive damage to motors, pumps, wells and to crops. Fuse or circuit breaker protection will be required on all three phases so that single-phasing will shut down the motor and save it from burning up trying to carry the load on one unprotected phase.

Naturally many more important changes have been made in the Code, but these will answer the more general questions as to what was done about some of the issues over which there was considerable discussion in recent meetings of inspectors. A more detailed report undoubtedly will be made in the News Bulletin of the IAEI.

TO INSURE that cream processed by the Avoset technique can be kept fresh for longer than a year, even at room temperature, the Gustine, Calif. plant of California Milk Products Co. protects every step of the process from airborne contamination by both Westinghouse Precipitron air cleaning and Sterilamp irradiation.

In the bottling room, at right, operators, medically examined every day, protected from the ultraviolet rays by sterilized uniforms, guide the steam sterilized bottles under the conveyors where Sterilamps protect them from contamination until and after they are filled. Other Sterilamps mounted on the ceiling keep the air of the room sterile and prevent mold formation.

Installed originally to provide cream for the armed forces, the process will now be used to do the same for domestic uses. A vegetable stabilizer such as used in ice cream prevents the milk solids from separating out of the cream in long storage.



Sterile Air Was an Absolute Necessity

Air cleaning, prior to its entry into the bottling and processing rooms, is accomplished by passing incoming air through mechanical filters, water washers and a Precipitron. Below is shown the cleaning of the collector plates of the Precipitron by washing them off with water. This is done after the plant is shut down each week.

Further insurance against contamination is provided by installation of Sterilamps in the air ducts. Below, Lee Hayes, plant engineer, is shown checking the ultraviolet radiation from the lamps in the air duct passing over the switchboard. The lamps are tested and inspected three times each week as a maintenance routine.

No Sinkings After the Dimout

Commanding General compliments light control men who volunteered to stop skyglow hazard

NO near-shore sinkings after light controls were established. These words are the greatest satisfaction which the many members of the electrical industry on the Pacific Coast who worked on dimout light control during the war now have for the long hours of volunteer work they gave to this unpopular task. A citation from the commanding general, Western Defense Command and concurred in by the commander of the Western Sea Frontier, has just been received and made public.

Faced with the ironic situation of having to reduce lighting when their entire lives had been devoted to increasing illumination, the light control men went into action as a team long accustomed to working together.

Explanations have been repeatedly sought for the excellent coordination in handling the light control restrictions necessary on the Pacific Coast in the early days of the war. The simple answer is that teamwork did it, throughout every level of operation.

All regulations were arrived at by way of committee hearings and by joint effort so that the widest practical range of opinion and experience would be represented. The requirements of the Army, Navy and Air Commands were carefully considered and just as carefully weighed against the vital necessity of adequate light for a maximum of both civilian safety and industrial production. At all times the work was carried on as a team, with military and civilian authorities cooperating closely with the Committee of Illuminating Engineers. Even at the peak of light restrictive effort, when thousands of air raid wardens and virtually the entire Pacific Coast membership of the Illuminating Engineering Society, together with the personnel of utility companies in the affected areas, were engaged in some phase of light control, the entire operation still functioned as a well-organized team.

The Light Control Division of the Ninth Region was established with ten regional consultants working in close cooperation with the chief of the division. These men, all veteran Western lighting men, list alphabetically as follows: C. T. Bakeman, Puget Sound Power and Light Co., Seattle; A. T. Benedict, San Diego Gas and Electric Co.; Dr. Leland H. Brown, Stanford University Illumination Laboratory; Crawford C. Hill, Pacific Gas and Electric Co., San Francisco; A. O. Olson, Bureau of Light, Heat and Power, City of San Francisco; Walter E. Potter, General Electric Lamp Department, Portland; George M. Rankin, Southern California Edison Co., Los Angeles; Theodore H. Shepherd, Department of Water and Power, Los Angeles; John S. Walsh, Pacific Gas and Electric Co., San Francisco; Fred J. Wellhouse, Westinghouse Electric Corp., San Francisco.

In addition to his capacity on the regional staff, each of the above was responsible either for important research or the engineering administration of large areas of the light restricted zone. To them, all credit for the successful day-by-day field administration of the West Coast Dimout.

HEADQUARTERS
WESTERN DEFENSE COMMAND

Mr. Frank A. Hansen
Illuminating Engineering Society
Los Angeles, California

Dear Mr. Hansen:

In the early days of the war it was deemed necessary to prescribe control of lighting along the coastline of the Pacific Coast in order to eliminate the silhouetting of ships at sea. In order to draw up the "dimout" regulations and to insure their enforcement, it was essential that the Commanding General, Western Defense Command, obtain the advice of trained specialists in this field. He therefore called upon you and other members of the Illuminating Engineering Society. The response to his request was most gratifying. The fine cooperative spirit of the members of that society in the solution of the problems involved materially assisted in obtaining the additional security which was necessary on the West Coast due to greatly increased ship traffic. No near-shore sinkings were effected by the enemy after the light restriction controls were established.

I wish to commend you and other members of the Illuminating Engineering Society who contributed to the "dimout" program for the splendid cooperation afforded this command, not only by furnishing technical advice but also by contributing the time necessary to make the many and frequent tests necessary to insure proper enforcement.

The Commander Western Sea Frontier has requested me to add his appreciation for the splendid work accomplished by you and your associates in this work.

H. C. PRATT
Major General, USA
Commanding

During the first year of the light restrictive period, Frank A. Hansen served as chief of the Light Control Division. When a persistent sinus condition made it advisable for him to step down, Fred J. Wellhouse carried on in the same position until the improving military conditions made it possible to ease, and then altogether lift, the "dimout". Wellhouse also succeeded Hansen as Pacific Coast regional vice-president of the Illuminating Engineering Society, so that each served in this office while being chief of Light Control Division.

What Makes It Work

Now an annual custom, the joint meeting of the Electrical Maintenance Engineers Assn. of Southern California and the Southern California Section, Illuminating Engineering Society, drew a record attendance, Oct. 17 and presented two features on fluorescent lighting that made the occasion exceptional.

The program opened with a sound film, *Electronic Light* by the lamp division, Westinghouse Electric Corp. It incorporated the basic operation theory and then went into the complete manufacturing details of fluorescent lamps, from glass furnaces to final inspection tests before release to the public. It proved to be the best film on fluorescent lamp manufacture and operation heretofore produced.

W. G. Darley, district engineer, General Electric Lamp Department then discussed fluorescent ballasts. The theory of operation and proper application, he brought out in a series of well executed demonstrations. A few samples of new lamps were shown to the group, but it was emphasized that some of the lamps would not be on the counters before the first of next year. Darley answered a flood of questions thrown at him at the end of his talk, demonstrating the great interest shown in this type of lighting.

Prior to the program, Clarence R. Miller, president of EMEA, had introduced to him and his group, Charles D. Gibson, State School Planning Commission, chairman of the IES. Barney Luley, Westinghouse Corp., secretary of IES, made the introduction. Frank Hanson, illuminating engineer, was requested to read a citation received by him from the Western Defense Command, commending him and his colleagues for the cooperation and excellent work accomplished during the dimout. Hanson, it was announced, has just been elected to rating of fellow in the IES, its highest rank of membership—*Henry Bush.*

Who

Mutual Loan Co., 947 Fourth Ave., San Diego, a jewelry and loan store. Lighting design by C. M. Thompson, San Diego Gas & Electric Co. lighting engineer. Installation by Gill Electric Co.

The Need

Beside general illumination of non-glaring quality throughout the store, it was desired to have a strong source of direct light concentrated over the jewelry counter to give sparkle and brilliance to the wares shown and sold there.

Conditions

Typical small store with about 12-ft. ceiling, on which an acoustical tile had been placed. Walls of medium reflection factor, woodwork bleached.

Installed

For general illumination, six 500-watt semi-indirect plastic fixtures with incandescent frosted lamps. For the counter, 18 type R-40 150-watt incandescent spotlights, recessed in the acoustical ceiling, on 2-ft. centers, placed about 1 ft. in front of the showcase below, to prevent reflection of the spotlights in the eyes of purchasers from glass showcase tops.

Results

General illumination approximately 30 f-c. Concentration of light on counters builds up to 200 f-c.

LIGHT FOR MERCHANDISING

The Need

Lighting both for display and selling of merchandise and also to contribute to the interior design of a modern clothing store for men.

Conditions

Narrow store, 15x75 ft., with clothing racks along each side, fitting space at the rear. High ceiling. Light woodwork and interior painting.

Installed

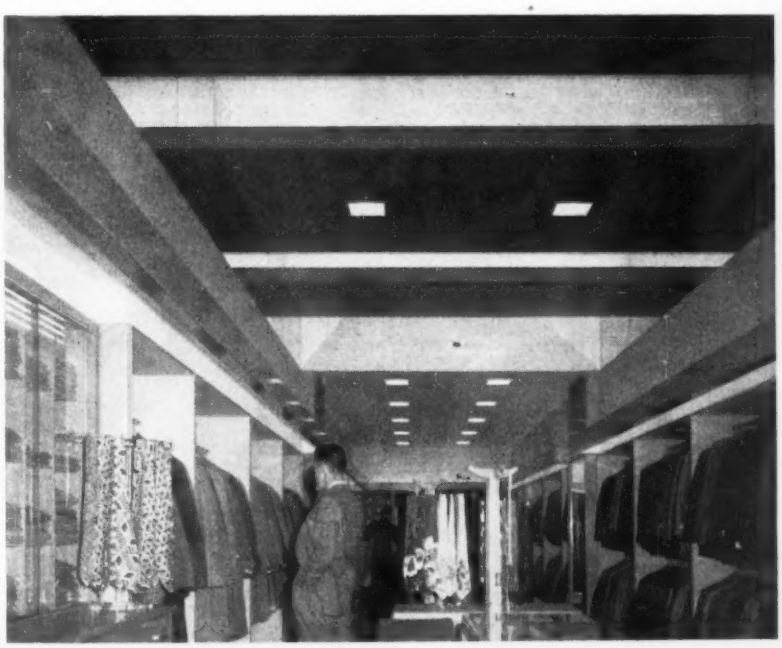
In the fore part of the store, advantage was taken of the high ceiling to make three coves across the store, at right angles to it, to break the appearance of its narrowness. Between these coves, the ceiling was dropped. In the dropped ceiling sections, two Holophane recessed units, lamped at 300 watts each, were inset. The entire rear section also had a dropped ceiling with parallel rows of Holophane units, ten in all, making a total of 14 for the store. The coves were equipped with four cold cathode "Cathon" tubes on each side, concealed from view by a molding. Tubes were 20-mm., 60-ma. white, operated from 15,000-volt transformers. To give extra punch to the clothing on display along each side, four rows of cold cathode tubing were concealed behind a valence at the front of the cases.

Results

An average intensity of 40 f-c throughout the store, with accented illumination where desired for merchandising assistance.

Who

Siegel Clothing Store, 1540 Broadway, Oakland. Interior design by Kurt Helmsteader, Grand Rapids Co., Portland. Lighting design by R. E. Will. Installation by T. L. Rosenberg Co., Oakland. Cold cathode "Cathon" lighting furnished by Spott Electric Co.



ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO 4

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Mobile Radio Telephony

MANY of the postwar wonder developments talked of during the war years were taken with a grain of salt, but one that will materialize and reasonably soon, is mobile radio telephony. With this new Bell service it will be possible to talk to any telephone subscriber from boats, ships, planes, automobiles, trucks and probably even trains. Any of these mobile stations also may be called. Conversation will be two-way as with ordinary telephone.

Two types of service will be offered. One will be urban mobile radio telephony and the other highway mobile radio telephony. Urban service will come first, later to be followed by the highway service, the latter being perhaps several years away.

Pacific Telephone & Telegraph Co. and Mountain States Telephone & Telegraph Co. both have applications pending before FCC to establish a single experimental channel in the San Francisco, and the Salt Lake and Denver metropolitan areas respectively. Both hope to make early installation when licenses are granted.

Power companies are very much interested in these new services as some see in them a solution to their communication needs between mobile automotive equipment and dispatchers, supervisors, main office, and in fact any telephone on the power system. One utility executive has said that he hopes the service will be available soon and that he would be quite happy to turn over his communication problems to those who have demonstrated their ability to render a high type, dependable service at ever lowering rates.

He may have something there, at that.

Western Cooperation

PIONEERING is an experience that brings closer fellowship among those who engage in it. In early Western communities men naturally tended to band together to face common difficulties or dangers and to accomplish tasks too large for the individual. It was natural then that in the electrical industry the common difficulties facing the pioneers drew them together into associations and joint programs of activity.

From that experience the cooperative idea spread to the East and over the world in the electrical industry. It worked. It produced results. It was superior to cut-throat competition.

In the reconversion period ahead there are many common problems facing the industry and special ones facing groups within the industry. Many are too big for the individual or the group or branch to handle alone. The sympathetic cooperation and help of other parts of the industry are needed.

Fortunately the machinery of cooperation has been kept alive in most instances. The associations and bureaus, the leagues and organizations have weathered a period during which they could receive little nourishment. Few meetings could be held and even those could be attended by only a few persons. The dissemination of information, the exchange of ideas and methods, the cooperative action on common jobs could only be carried on with difficulty. But the associations kept alive. Many did outstanding work for their members and the industry.

With this mechanism of cooperation, the associations, leagues and bureaus, both those serving a single branch of the industry or a single community and those of broader coverage correlating the efforts of the entire industry, can now be given transfusions of life to provide them the strength they need for the tasks they must tackle for us all. Great jobs lie ahead for these cooperative organizations, fine opportunities, a tremendous market to develop.

In many more areas of the West the power companies are placing full reliance for their load building upon such organizations of dealers and distributors. It is a big responsibility as well as a fine opportunity. It bespeaks the faith these utility companies have in the efficacy of the cooperative idea.

To the many hundreds of newcomers to the West

entering this industry, the cooperative idea may be new. Here is a task in education and salesmanship for the pioneers who have carried the idea thus far to acquaint these newcomers with the benefits, the techniques and responsibilities of working together in harmony.

Underwriters' Bottleneck?

RUSHING to get into production and distribution of appliances and devices, some manufacturers have complained that delays at Underwriters' Laboratories in testing the equipment were causing them costly retardation of their ability to supply an eager market with long awaited new appliances. By the time the complaint echoes around from mouth to mouth a few times, each time gathering volume, the situation sounds very serious. That good old institution, relied upon so confidently during normal times as a safety filter, is held up as inadequate and undermanned and a block on the road to progress.

Yet investigation finds it anything but such a retardant, and its hard working, conscientious engineers, striving to serve an impatient industry speedily, naturally feel that such criticism is poor payment for the extra hours they put in to accommodate manufacturers and distributors.

It is true that the Laboratories staff is at a low ebb, just as nearly everyone's else staff these days. For like most concerns, the Laboratories must await the return from the armed services of some of their men. They have the G-I's right to that job and it must be kept open for them. Meanwhile the employment of new engineers is difficult because such technically trained men are still at a premium. Even the manufacturers are trying to find such men themselves.

Then too, many makers of devices are somewhat new to the field and either do not know about Laboratories testing or forget it in their rush to make something to sell. The result is that they have a product all ready to be distributed to an awakening market when the question is asked whether their appliance has Underwriters' approval. They run right into the unsafe appliance ordinances which have been passed in so many Western communities. There is no market in such towns unless their device tests up to safety standards.

Such oversight by manufacturers in planning to submit and have tested samples of their product sufficiently long in advance cannot be blamed upon the Underwriters'. Under normal procedure, it takes from three to four weeks to process each application and conduct the requisite tests. If defects are found, as they often are, the manufacturer is required to correct them and submit new samples, which takes more time. Much of this time could be saved by foresight in consulting with the engineers of the Laboratories and learning what the American Standards require, and then designing equipment to meet such standards.

A good deal of the complaint is just old American gripe. It used to be directed at the OPA and the WPB and WLB and the war, and now is being burned up on suppliers of materials and on labor and even reaches out to hurt old friends like the Laboratories staff. It is, a lot of it, just impatience and thoughtlessness and, as such, not very constructive. It would be much more to the point to anticipate necessary processing time, be sure equipment design is safe by reference to the standards, and it will be found that there are no more delays than there were in peace times before all this rush of war became a pattern of living.

In the language of the old pioneer barroom, "Don't shoot the piano player He's doin' the best he can."

ELECTRIC power has been made such a political issue that many people have lost sight of the real principle involved. It isn't the argument most commonly used by administrators that they can furnish power cheaper than can highly taxed private business. It is something far more fundamental than that. It is a drive to convert our free economy to some form of state socialism in which the iron hand of government bureaucracy would control all things . . . The people should get the issue straight and then decide whether they want to change our country from a nation of private business to one of stateism. If we favor putting the government into the power business to save a dime, we should be a hundred times more anxious to put it into farm production, the clothing business or housing, not to mention the countless other activities on which we are so dependent. If we in America want to work for the government instead of for ourselves then we should vote for socialized industry. But don't be fooled into believing that half the business of a nation can operate without profit while the other half is allowed to make a profit, for notwithstanding the clear propaganda of patronage dispensers that government grants are gifts, every dollar distributed by government must first be taken from the people in taxes on their earnings and their business. The nation's industry must be preserved as free institutions if we are to be saved from becoming mere pawns in a completely regimented system. — A. S. Cummins, president, California Oregon Power Company.

IAEI Holds Tabloid Meeting in Seattle

Executive committee conducts business, then discusses code changes; elections by mail

DEPRIVED of its proposed and already condensed annual meeting at Longview at so short a notice as to make it impossible to arrange for another meeting place, the Northwestern Section, International Association of Electrical Inspectors held an augmented executive committee meeting, Sept. 24, at Olympic Hotel, Seattle. It was attended by all but one member of the executive committee, by the executive council and Electrical Committee members for the section and several others and became a tabloid version of the usual annual meeting.

Primarily it was called to conduct official business and elect officers for the coming year. The nominating committee, appointed by President Harry Hilpert, Washington State electrical inspector, Seattle, and consisting of Chester Kirsop, Olympia, chairman; J. Hyde Stayner, Salt Lake City and L. B. Garff, Tacoma, nominated the following which were accepted by the executive committee and will be submitted to the membership by letter ballot:

For president, C. S. Alger, supervising meter and service inspector, Puget Sound Power & Light Co., Seattle; first vice-president, R. J. Larrabee, Underwriters Laboratories', Inc., Seattle; second vice-president, L. W. Carlisle, electrical inspector, Oregon state, Eugene; secretary-treasurer, W. L. Gaffney, chief inspector, Tacoma; and on the executive committee in addition to the officers, Ralph Grant, city electrical inspector, Havre, Mont. (active member); D. J. Wolters, chief electrical inspector, Salt Lake City (active); R. E. McDonough, Montana Power Co., Butte (associate, class A member); R. A. Church, Puget Sound Power & Light Co., Seattle (class B); W. I. Downie, Trumbull Electric Mfg. Co., Seattle (Cooperating, class C); and S. B. Clark, Northwestern Electric Co., Portland (cooperating, class D). Executive Council IAEI member, W. L. Gaffney. Member of the Electrical Committee, NFPA, L. W. Going, and W. L. Gaffney, alternate. (Church would take office as representative of the Electric Club of Washington.)

Reports from Secretary-Treasurer Gaffney indicated the section had grown in membership from 469 to 490 members, of which 172 are active members; that the finances had held up despite war conditions and moving of the offices of secretary from Portland to Tacoma. H. S. Morr, chairman of the Utah Chapter made a report in person; Alger reported for the Puget Sound Chapter, Gaffney for the Tacoma division of the latter, and a report by James G. Clune, Montana Chapter secretary, was read.

Present too were IAEI President L. P. Dendel, Lansing, Mich., and IAEI Secretary, Victor H. Tousley, Chicago, and James S. Mahan, Chicago, chairman of the IAEI membership committee.

President Dendel urged inspectors to conduct educational classes for the many new electricians coming into the field since the war, to acquaint them with the code and wiring requirements of their localities. "While it may take a few of your spare evenings, it will repay you later in the time saved on the job, at the office or in the field inspecting," he said. He also expressed the thought that the inspector's success was measured by his service.

Discussion of the IBEW proposal to the Electrical Committee in respect to grounding, bare neutral, etc., and given the nickname, "correct principle" was held informally. Bare neutral was generally opposed, particularly because of probable damage to insulated conductors, but instead of opposing grounding the range neutral to the frame, all but one expressed opinions favoring it after years of trial, reporting no trouble from it. On the other hand, some reported difficulty when the individual ground conductor became disconnected accidentally and others cited cases of potential gradient because of high-resistance in the ground conductor. Nor was support given to objections to grounding the neutral at each building.

In appointing a committee for the next meeting place, the motion was made that favor be shown to Boise, Idaho, and that Lester Johnson of Salt Lake City be asked to serve on the arrangements committee.

Remaining time was turned over to Tousley who discussed several of the issues soon to come before the Electrical Committee for the revision of the National Electrical Code. Among these was Article 310, relating to conductors, during which thermoplastic coated conductors came in for considerable criticism. Failures were reported from the field, due to breakage of insulations under conditions that should not have been considered unfavorable. Stiffer copper than used in Type R wire, too, was claimed against the synthetic wire, which caused greater resistance in pulling through conduit. Lack of markings to identify the manufacturer was also criticized.

Only touch of the customary Northwestern Section social event in connection with the annual meeting was a dinner the evening of the meeting attended by executive committee members, their wives and guests, 21 in all, at which hopes for a full scale convention next year were advanced by all.

Heating Conferences

Two important heating conferences are scheduled for early December. The first will be a high-frequency heating conference in Los Angeles, Dec. 3 and 4 under the auspices of the Southern California Metals Society. Arrangements are in the hands of G. N. Hawley, manager of industrial sales, Southern California Edison Co. The program will be directed primarily to industrialists, but utility men interested in the promotion of this new industrial tool will derive equally as great benefit. The program will contain several eastern papers and will be patterned somewhat after the very successful Chicago conference that brought an attendance of 3,000.

Of equal interest will be an electric house heating conference to be held under the auspices of the Electric Heating Society in San Francisco, tentatively scheduled for Dec. 5 and 6. Arrangements are in the hands of Tom Mellon of Wesix Electric Heater Co. The St. Francis hotel will be headquarters and has agreed to accommodate a limited number.

Following these conferences will be the PCEA meetings in Fresno, Dec. 7 and 8. The three meetings were arranged for the same week in order that those from the Pacific Northwest and the Rocky Mountain region who are interested in all three might attend with a minimum amount of time away from their offices.

● THE CALIFORNIA MUNICIPAL UTILITIES Assn. was scheduled to hold a meeting in Fresno, Nov. 15 and 16. President of the association is G. A. Baxter, secretary of the Alameda Public Utilities Board.

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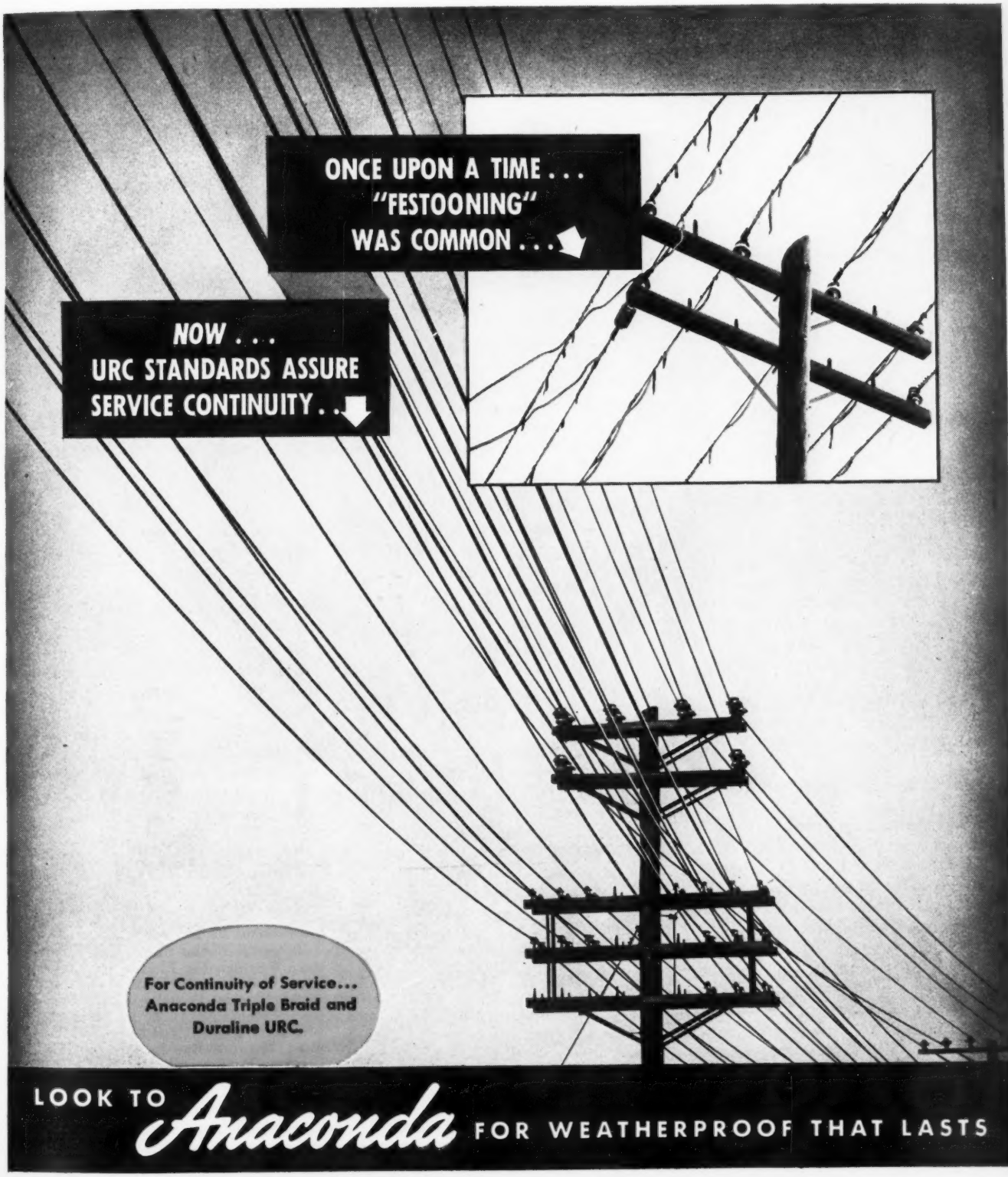

LOOK TO *Anaconda* FOR WEATHERPROOF THAT LASTS

PCEA Panorama — Edited by A. X. Schilling

Fresno Conference

First state-wide meet since war, Dec. 7-8

THE Pacific Coast Electrical Assn.'s first joint state-wide conference since war began promises to be an interesting one, with many highly important topics scheduled for discussion. The meeting will be held in Fresno Dec. 7 and 8, and a large attendance is expected.

During its meeting on Sept. 15, the guidance committee for the Business Development Section decided upon the following program:

Friday, Dec. 7

1. *Adequate Wiring*, 9:00 to 10:15 a.m., *Elbert Kramer:*

a. New Walt Disney full-color picture on the subject of wiring.

b. Panel interview of representatives of financial institutions, building contractors, architects, realtors and insurance agents on the subject of the need for adequate wiring in new construction.

c. Report on steps taken locally and nationally to promote adequate wiring.

2. *Range and Water Heating Wiring*, 10:15 to 10:45 a.m., *M. G. Sues:*

Report on plan of coordinating range wiring throughout the state. This should prove of exceptional interest, being one of the most important subjects dealing with the sale and installation of electric ranges and water heaters.

3. *Highway Lighting*, 10:45 to 11:15 a.m., *I. W. Borda:*

Trends in Highway Lighting. The many new ideas and developments during the past few years will be discussed.

4. *Codes and Ordinances*, 11:15 to 11:45 a.m., *M. G. Sues:*

a. Progress report on the proposed amendments to the uniform ordinance.

b. Proposed steps necessary to make the ordinance available for county-wide use.

c. Progress report on Unsafe Electrical Appliance ordinance.

5. *Rural Electrification*, 1:30 to 2:30 p.m., *Dr. H. B. Walker:*

Dr. Walker will express his views as to future prospects for electrifying farms.

6. *Industrial Conversion*, 2:30 to 3:00 p.m., *G. N. Hawley:*

Hawley will bring us up to date with an outline of the problems of industrial conversion in California and tell of the progress being made.

7. *Sales Training*, 3:00 to 3:45 p.m., *Willis M. Kenealy, Walter Elieson:*

Elieson is with the Department of Commerce and Kenealy is with the State Department of Education, which assures an interesting and informative discussion.

8. *Store Modernization*, 3:45 to 4:30 p.m., *B. W. Reynolds, H. C. Rice:*

This important subject is being covered in connection with the Business Planning Institutes by Frank Cox, who will bring some new ideas for the electrical merchant. To compete for consumer dollars, the electrical dealer will require modern store arrangements and front; there will be ideas for him during this discussion.

Saturday, Dec. 8

1. *Liquified Petroleum*, 9:30 to 10:15 a.m., *J. P. McElroy:*

This very comprehensive report will outline the extent of the competitive threat of liquified petroleum to the electrical industry and will suggest some ways and means to combat this type of competition.

2. *Fluorescent Lighting*, 10:15 to 11:15 a.m., *George Tenney:*

We'll hear from Leonard Hobbs, who is an authority on the subject and well equipped to inform us.

The guidance committee for the Operating Economics Section met on Sept. 19 and decided to meet as a group on Dec. 7 to discuss the following subjects:

Friday, Dec. 7, Morning Session

1. Atomic Energy.
2. Effect of reorganization and new safety orders of the Industrial Accident Commission.
3. Carrier Current Relaying.

Afternoon Session

1. Fire Control.
2. High-speed single-pole reclosing.
3. Aluminum—its potential use in the electrical industry.

Saturday, Dec. 8

On Dec. 8, the Operating Economics Section will meet in seven different groups, to discuss the topics indicated.

Transmission and Distribution Group:

1. Sags and tensions.
2. Report on rural extensions.
3. Lightning protection of distribution transformers.

Substation Group:

1. Unit substations.
2. Remote alarm systems.
3. Oil circuit breaker modernization.

Generation Group:

1. Economics of generator overloading.
2. Operating experience with various fuels.
3. Round-table discussion.

Meter Group:

1. Meter corrosion.
2. Thermal type demand meters.
3. Round-table discussion.

Transportation Group:

1. Transportation of work crews.
2. Military surplus vehicles.
3. Round-table discussion.

Accident Prevention Group:

1. Lineman training.
2. Grounding and testing devices.
3. Round-table discussion.

Communications Group:

1. Carrier telephone.
2. Two-way radio.

The Administrative Services Section plans to discuss either personnel or customer relations during the Fresno meeting and will set dates for future meetings during which the alternate and claims and stores will be discussed. In addition to these four meetings, the section will meet with members of the Pacific Coast Gas Assn. as follows:

Purchasing, Nov. 28, 29, in San Francisco.

Internal Auditing, Dec. 19, 20, in Los Angeles.

Pay roll, Feb. 20, 21, in Riverside.

Commercial Problems, March 20, 21, in San Diego.

The above four meetings have been arranged by the Gas association, which has invited PCEA members to attend. In return, the Administrative Services Section will arrange meetings to discuss claims, stores and personnel or customer relations, to which Gas association members will be invited.

Committees

Committees for 1945-46 have been announced as follows:

Adequate Wiring Committee: Elbert Kramer, Westinghouse Electric Corp., Los Angeles, chairman; R. Graham Holabird, National Electric Products Corp., San Francisco, vice-chairman; R. E. Arbogast, Newbery Electric Corp., Los Angeles; Milo Cain, Coast Counties Gas & Electric Co., Santa Cruz; F. E. Claycomb, General Cable Corp., Los Angeles; W. C. Figroid, Gilson Electric Supply Co., Oakland; Patrick J. Furlong, Century Electric Construction Co., San Francisco; E. H. Galchutt, Graybar Electric Co., Los Angeles; J. A. Hill, Pacific Gas and Electric Co., San Francisco; Lawrence

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Guidance Committee, Administrative Services Section: F. U. Naylor, Pacific Gas and Electric Co., San Francisco, chairman; Leon S. Heseman, California Electric Power Co., Riverside, vice-chairman; A. D. Bragg, General Electric Co., San Francisco; L. W. Coughlan, Pacific Gas and Electric Co., San Francisco; R. J. Doyle, Southern California Edison Co., San Bernardino; G. M. Henderson, Coast Counties Gas and Electric Co., Santa Cruz; R. A. Hopkins, Westinghouse Electric Corp., Los Angeles; T. P. Ludcke, Pacific Gas and Electric Co., San Francisco; J. A. Talley, California Electric Power Co., Riverside; J. K. Uhler, Jr., Southern California Edison Co., Los Angeles; E. J. Wright, San Diego Gas and Electric Co.

Air Heating Survey Committee: T. W. Snell, Pacific Gas and Electric Co., San Jose, chairman; Fred D. Benz, U. S. Rubber Co., San Francisco; W. E. Cranston, Jr., Thermador Electrical Mfg. Co., Los Angeles; H. H. Douglas, Southern California Edison Co., Los Angeles; W. S. Fleming, California Electric Power Co., Riverside; R. L. Hayden, Coast Counties Gas and Electric Co., Santa Cruz; Frank W. Jordan, Westinghouse Electric Corp., Los Angeles; Thomas J. Mallon, Wesix Electric Heater Co., San Francisco; P. P. Pine, San Diego Gas and Electric Co.; John S. C. Ross, Pacific Gas and Electric Co., San Francisco; B. M. Tassie, General Electric Co., San Francisco.

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Fluorescent Lighting Committee: George C. Tenney, ELECTRICAL WEST, San Francisco, chairman; A. I. Benedict, San Diego Gas and Electric Co.; O. B. Doerr, Pacific Gas and Electric Co., San Francisco; R. L. Hayden, Coast Counties Gas & Electric Co., Santa Cruz; M. C. Hixson, General Electric Co., Oakland; L. A. Hobbs, Smoot-Holman Co., Inglewood; M. H. Jankelson, Incandescent Supply Co., San Francisco; R. C. McFadden, Southern California Edison Co., Los Angeles; L. A. Rice, Electrical Products Corp., Los Angeles; A. B. Smedley, Pasadena; F. J. Wellhouse, Westinghouse Electric Corp., San Francisco; D. B. Wheelock, California Electric Power Co., Riverside.

Highway Lighting Committee: I. W. Borda, The Okonite Co., San Francisco, chairman; A. E. Holloway, San Diego Gas and Electric Co.; James F. Pollard, Pacific Gas and Electric Co., San Francisco; R. C. McFadden, Southern California Edison Co., Los Angeles.

Technical Subcommittee of Highway Lighting: G. H. P. Dellmann, San Diego Gas and Electric Co., chairman; Milo Cain, Coast Counties Gas & Electric Co., Santa Cruz; J. E. Hammond, Pacific Gas and Electric Co., Fresno; Karl M. Koch, General Electric Co., San Francisco; L. W. Luley, Westinghouse Electric Corp., Los Angeles; G. M. Rankin, Southern California Edison Co., Los Angeles; L. W. Towner, General Electric Co., Los Angeles; G. A. Trosper, Pacific Gas and Electric Co., San Francisco; F. J. Wellhouse, Westinghouse Electric Corp., San Francisco.

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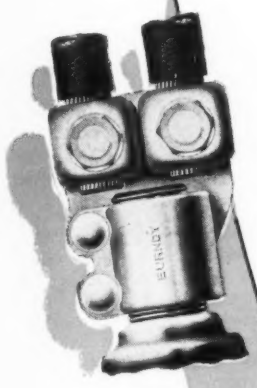

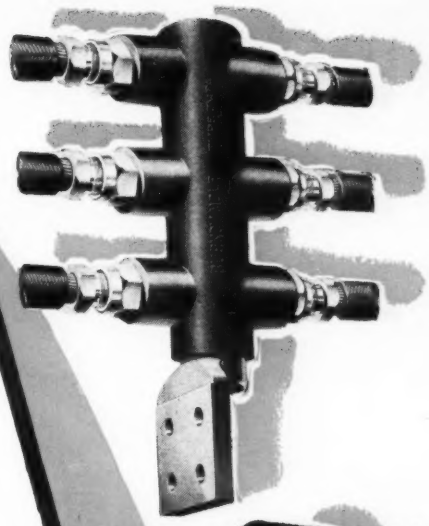

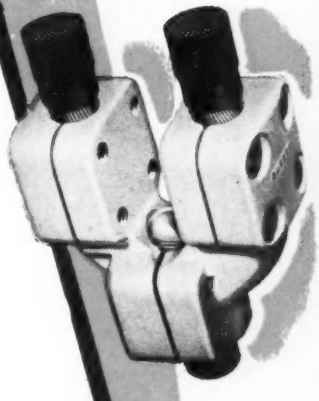

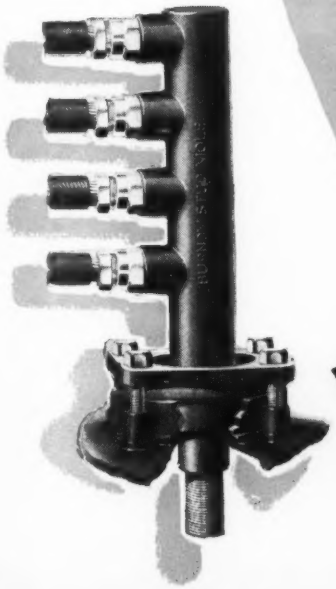

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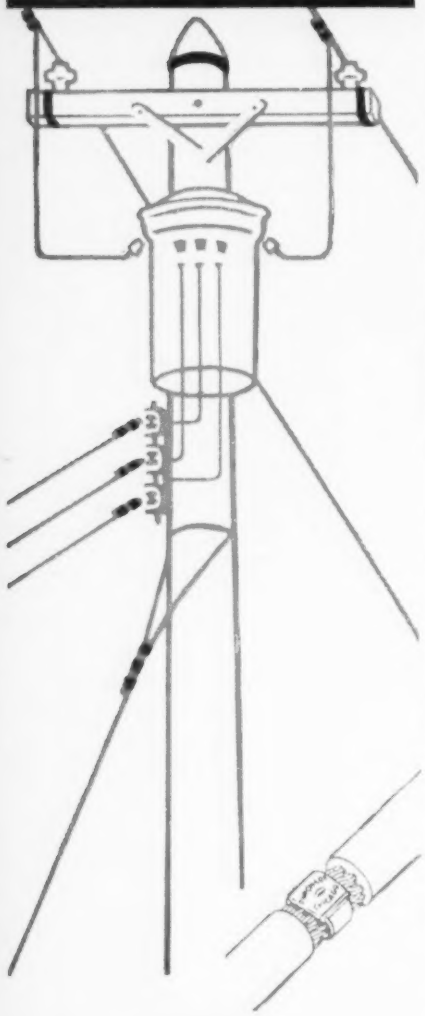

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Reconversion Challenge

Chester H. Lang, a vice-president with a voice and something to say, a rare thing among vice-presidents, awoke the electrical industry from postwar hesitation with a reconversion challenge to it to apply the same genius for organization that had been so spectacular in winning the war. He spoke Oct. 22 at the Electric Club of San Francisco. Lang is vice-president and manager of sales for the apparatus division, General Electric Co., Schenectady. Recounting vividly the work of the Seabees and construction groups of the army in the Pacific, whose activities he had observed in recent official visits to war fronts, he asked the electrical industry to think of an objective and to drive toward it rather than be too concerned with rate of return. The thing that will save the American enterprise system, he indicated, is plenty of enterprise.

● Alfred Byers, secretary, National Electrical Wholesalers Assn., paid a visit to the West, holding small group meetings of wholesalers in each city in which he stopped, in lieu of the usual annual or semi-annual meetings of the Pacific Division, NEWA. He held such meetings in Salt Lake City, Seattle, Portland, San Francisco and Los Angeles. The last was the largest and most lively meeting, the discussion ranging over the field of government regulations, taxes, availability of supply, legal aspects of the business and the new merchandise distributors' section of the association.

● New Governors from the Western chapters of National Electrical Contractors Assn., announced just before the Oct. 29-31 annual meeting in Cleveland, include A. R. Johnson, Portland; J. D. O'Connor, president, Northern California Chapter, Sacramento, succeeding T. L. Rosenberg, Oakland; J. B. Shamel, Los Angeles, as alternate for Richard Arbogast, Los Angeles Chapter.

In view of the interest in "Smog," the September dinner meeting of the EMEA of Southern California was well attended to hear a talk on *Dust and Fume Control*, delivered by Harry V. Welch, chief technologist of the Western Precipitation Corp.

Welch opened this talk with a discussion of what constitutes dust, particle sizes and the fields in which dust and fume was harmful to health. He pointed out five methods of dust and fume recovery. First, gravity-settling chambers, two inertia and baffled dirt chambers and cyclonic equipment, three bag houses, four scrubbers, spray towers etc. and fifth electrical precipitation. He then described the methods for testing and mentioned a still further method, thermal collection. Here a hot wire in a tube, or a series of hot wires between plates, collects the material.

In the gold mines in the land of South Africa it was found that in the mine ways the air contained 50 milligrams of dust per cubic meter and sometimes ran as high as 500 milligrams. This was cut to 25 and finally to one milligram with the result that the cases of tuberculosis etc. were eliminated. In general, in the United States, one milligram of dust per cubic meter (by weight) is considered safe.

The talk was illustrated with 50 slides showing particle sizes different kinds of dust and fume and plant installations of collecting equipment. The meeting was then thrown open for questions and of course the local "Smog" question was thoughtfully discussed.—Henry Bush, publicity chairman.

Members of the Electrical Maintenance Engineers Assn. of Northern California witnessing a dynamic balancing demonstration at new San Francisco service shops of General Electric Co. at Seventh and Harrison St. G-E was host at a housewarming, with refreshments, to 150 members and guests of EMEA at the association's October 11 meeting. Other demonstrations included metal spraying, coil winding and taping and fractional horsepower motor rewinding

Strong Returns

Elias J. Strong returned as manager of the successor to the league he had managed before, the Intermountain Electrical Assn., as of Oct. 16, Ora H. Barlow, president, announced. Strong left the Electrical League of Utah in April 1942, to become secretary to Governor Maw of Utah, which position he has recently resigned to return to the league.

During his absence, the customary activities of the league have been recessed during the war and he now returns with the recurrence of the need for active and industry-wide promotional activity. One of his first moves was to attend the annual meeting of the International Association of Electrical Leagues at Chicago to brush up on league techniques and programs among the managers of the other electrical organizations of a similar character.

Strong came into league work from active merchandising experience as a salesman for Utah Power & Light Co. He organized an adequate wiring program, several sales campaigns among dealers and assisted in various ways to cement the industry together. The scope of the reorganized Intermountain Electrical Assn. will be broadened and its field of activity spread in to many more cities in Utah and southern Idaho.

● Electric Club of Los Angeles held its fall golf tournament Oct. 15, at which Ralph T. Adamson, Westinghouse, won low net; Doug Kendall, Square D, was next; R. T. Dickey, Department of Water & Power, third. Low gross went to N. W. Graham, Graham-Reynolds; Dick Young, Bethlehem Steel, and Fred Cole, Cole Electric. Peter Diederich, Glendale superintendent of Water, Power & Light, was the hole-in-one winner, with Ed Potter, Nelson R. Thomas Co., and Ed Gould, Anaconda, as second and third. Dick Young was chairman of the golf committee which put on the tournament.

● San Diego Electric Club had a month of high-powered electrical programs in October, culminating with a talk on *The Atomic Bomb and Its Aftermath* by L. M. Klauber, vice-president and general manager, San Diego Gas & Electric Co., Oct. 30. At the Oct. 23 meeting, J. B. Binns, R. V. Davis and E. N. Goris of General Electric Co. explained and demonstrated the B-29 remote gunfire control system, with a complete turret present to operate. H. A. Cordes was chairman of the day. On Oct. 9, Westinghouse presented E. W. Hulse, who told of *Practical Applications of High-Frequency Heating.*

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NEWS of the industry

REPORT PUGET POWER DEAL INDEFINITELY POSPONED

As this issue went to press, news stories from Seattle reported the deal "indefinitely postponed." Investment men had returned to Chicago and differences had developed among the PUDs, press reports stated.

A break in negotiations for purchase of Puget Sound Power & Light Co. by 15 Washington PUDs was threatened last month, with charges of "secrecy" and talk of a congressional investigation.

Two factors contributing to the threatened breakdown were: 1. Continued insistence of President Frank McLaughlin that the prospective buyers must prove ability to perform before he would submit the plan to stockholders. 2. Fact that identity was withheld of the PUD acting as intermediary between the prospective buyers and the company.

In Washington, D. C., Representative Lyle Boren, D., Oklahoma, was reported to have charged that the projected sale was another Nebraska power deal and threatened to call for a congressional investigation.

Representatives of Chicago investment banking interests held secret conferences in Seattle for several days. Complaint also was made that there was no announcement of how the districts plan to administer the holdings, how they intend to carry out their promises of reduced rates, what they propose to do with the distributing system within Seattle's jurisdiction.

Seattle has declared that it isn't going to be sold a pig in a poke. Fear was expressed that the facilities might be "rammed down our throats at an arbitrary price" or that the city might face cut-throat competition from PUDs, since it had been asserted that, under state law, the districts would need no franchise to operate in Seattle.

In refutation, the PUDs announced that they would give a pledge in writing to the city not to enter into cut-throat competition, and explained that Seattle does not have to buy the facilities but may have them for nothing, if she is willing to wait for them.

As the bonded indebtedness is retired through earnings, the entire distribution system will become cheaper, C. W. Laing, Jr., of John Nuveen & Co. stated. "In from 25 to 40 years, depending on the earnings, it will automatically revert to the city. Seattle may step in at any time and buy it. The longer it waits, the cheaper it will become." The generation and transmission facilities, he said, would be retained by the district issuing the bonds and be operated by it, for the equal benefit of Seattle, Tacoma, the PUDs and any other public power interests, in a power pool which is designed to deliver the greatest amount of power at the lowest possible cost to each agency.

Linn PUD Costs, Revenues Estimated by Commission

In its final report on the proposal to create a PUD in Linn County, Ore., the state hydroelectric commission declared that a $2,110,000 power system could be financed by revenues received over a 30-year period.

The commission estimated the district's annual revenue would be $360,870, with operating costs of $203,909, leaving $156,961 a year for debt retirement.

The proposed district would include about 990 square miles in which 24,500 people would be served. Albany and Lebanon, largest municipalities in the area, are not included.

Proceedings to form the district were initiated by filing of preliminary petitions last April. In its report the commission said that if an election is held on the proposal, no bond issue or question of policy in the matter of acquisition or construction of an electrical distribution system will be involved.

The PUD's original plan calls for the purchase of Mountain States Power Co. properties in the area, but as yet no estimate of its value has been announced.

● CONDEMNATION proceedings have been filed at Kelso, Wash., by the Cowlitz County PUD against Northwestern Electric Co., which serves the Kalama and Woodland, Wash., areas, and Pacific Power and Light Co., operator of Aerial Dam on the Lewis River. The complaint disclosed that the PUD commissioners had adopted a resolution proposing to take over the power company holdings at a price not to exceed $300,000.

● STICKERS urging municipal ownership of electrical facilities were circulated recently in Spokane. The red, white and blue stickers were placed on posts, windows, and buildings and mailed on cards. City officials denied any part in the circulation.

CITY ADVOCATES UNIFORM NATIONAL POWER POLICY

Offering special schedules to the aluminum industry for a limited time, representatives of the Los Angeles Department of Water & Power last month urged a uniform national power policy to correct rate differences of federally financed hydroelectric projects.

Northcutt Ely, department attorney, told Senate surplus property investigators that the nation is "entering an era of competition between great federal power projects." Different financing schemes for publicly built generating and distribution systems have caused differences in operating costs in individual units of the government's surplus aluminum plants, he pointed out.

E. F. Scattergood, department advisory engineer, said local power rates would be lowered for three years for certain electrochemical enterprises. Declaring that closing of the Torrace reduction plant was due to labor shortages, not electricity costs, he stated that the city would meet objections that aluminum smelting costs are too high in the southwest by furnishing energy at reduced rates for two spot lines at the plant, on condition that a sheet-rolling mill is built to supply all needed types of aluminum for local manufacturing. For a three-year period, the present rate of $2.10 per kilowatt would be reduced to $1.75.

Answering charges that Los Angeles is unwilling to provide power at sufficiently low cost, Ely declared that the city, the Southern California Edison Co. and all power users in the area are paying the entire cost of constructing Boulder Dam and still are willing to lower rates.

Utility No Longer Under Holding Company Act

Ruling that Pacific Gas and Electric Co. can no longer be considered a subsidiary of North American Co., SEC last month removed the utility from jurisdiction of the Holding Company Act. The decision makes PG and E subject solely to California Railroad Commission regulation.

The commission order was made on application of the company and supersedes a 1941 order establishing the subsidiary status. North American has disposed of a large amount of PG and E stock and at present owns only 5.24%.

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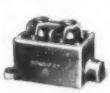

Type EFS Explosion Proof Condulet with Double Pilot Light

Type GS Condulet with Shock Absorbing Lamp Receptacle *for use on machinery*

Type VDA Vaportight Observation Light Condulet *for mounting in vats*

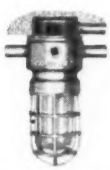
Type LMKB Lighting Condulet

Type LMG Lighting Condulet

Type WV Vaportight Lighting Condulet with Fresnel Lens

Type VPH Vaportight Indirect Lighting Condulet

Type VR Vaportight Lighting Condulet *for mounting on a hand rail*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Type V Vaportight Heavy Duty Lighting Condulet with Shatterproof Globe *for use in the food industry*

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Type VXHA Vaportight Lighting Condulet with Flush Hubs

Type VDB Vaportight Lighting Fixture Condulet with Dome Reflector *500 Watt*

Type EVS Explosion Proof Portable Lamp

Type RMC Watertight Marine Lighting Fixture

Type MLC Watertight Marine Lighting Condulet Shock Absorbing Receptacle

Type MLC Watertight Marine Lighting Condulet

Type VC Vaportight Lighting Fixture Condulet

Type LPH Safety Hand Lamp

Type EVG Explosion Proof Lighting Condulet *for gasoline pumps*

Type DLA Dust Tight Lighting Fixture Condulet with Flat Cone Reflector

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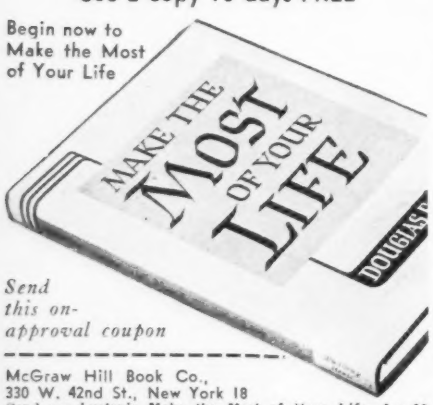

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B.C. ELECTRIC PURCHASE DISCUSSED IN REPORT

A plan for purchase and operation of B. C. Electric Railway Co. has been submitted to representatives of 31 cities in the lower mainland area and on Vancouver Island in a report by engineers investigating the proposal.

Acquisition of B. C. Electric by the public has been advocated for several years and, during the past two or three, strong efforts have been made to secure such action by the provincial government. The government, in turn, passed the ball back to the municipalities, with the suggestion that it would be willing to assist in financing purchase by them.

According to the engineer's report, it would be possible to operate the system at a profit which would repay the purchase price in 40 years and provide $45,000,000 annually for maintenance, improvements and new construction. Under this plan the entire B. C. Electric system would first be purchased by the provincial government.

The report indicated purchase price of all B.C.E.R. holdings would lie between $70,000,000 and $80,000,000. The report suggested procedure would be for the Provisional Power Commission to acquire all generating and transmission facilities.

Under the plan districts comprising municipalities in each area would handle electric distribution systems, gas manufacturing and distribution, urban transportation systems, including street railways and bus lines.

One utility district would include Greater Victoria area covering Victoria, Saanich, Esquimalt and Oak Bay. This district would acquire all electric distribution, gas manufacturing and distribution, and all street railway and motor bus systems in the area.

The utility districts would purchase their power from the Provincial Power Commission. Each would be directed by a three-man board of utility commissioners, appointed by the lieutenant-governor-in-council, and vested with wide powers similar to those enjoyed by the power commission.

Commissioners could have no interest in the power undertaking and it would not necessarily be their full-time job. They would receive an annual salary. They would not represent any particular interest or any geographical section of the province.

Each utility district would be a self-contained unit incurring no responsibility for the municipalities within its sphere.

● LEBANON (ORE.) PUD, if it took over electric and water properties in its area, would be able to buy or build an additional system costing $692,000, the Oregon State Hydroelectric Commission reported recently. The state tax commission had reported value of existing systems, owned by Mountain States Power Co., at $335,000.

Total annual revenue from the two systems is $162,900 and operating revenues reach $114,000 annually, the commission said. Lebanon is excluded from the proposed Linn County PUD.

Condemnation Jury Sets Value on PGE Properties

A market value of $801,000 for the Portland General Electric Co.'s properties in and near Vancouver, Wash., which Clark County PUD seeks to acquire, was set by the jury that heard condemnation proceedings in the United States district court at Tacoma, Wash. The amount includes both market value and severance damages.

Estimates on the market value of the property ranged from $640,000 plus $54,000 severance damages, set by R. L. Baldwin of Kansas City, testifying for the PUD, to $1,200,000 plus $250,000 severance damages, set by Jay Samuel Hartt, Chicago consulting engineer, a company witness. PUD attorneys called the verdict "very fair."

Motion by the company for a new trial was denied by Judge Ben Harrison. Attorneys for the company announced that an appeal will be taken to the United States circuit court.

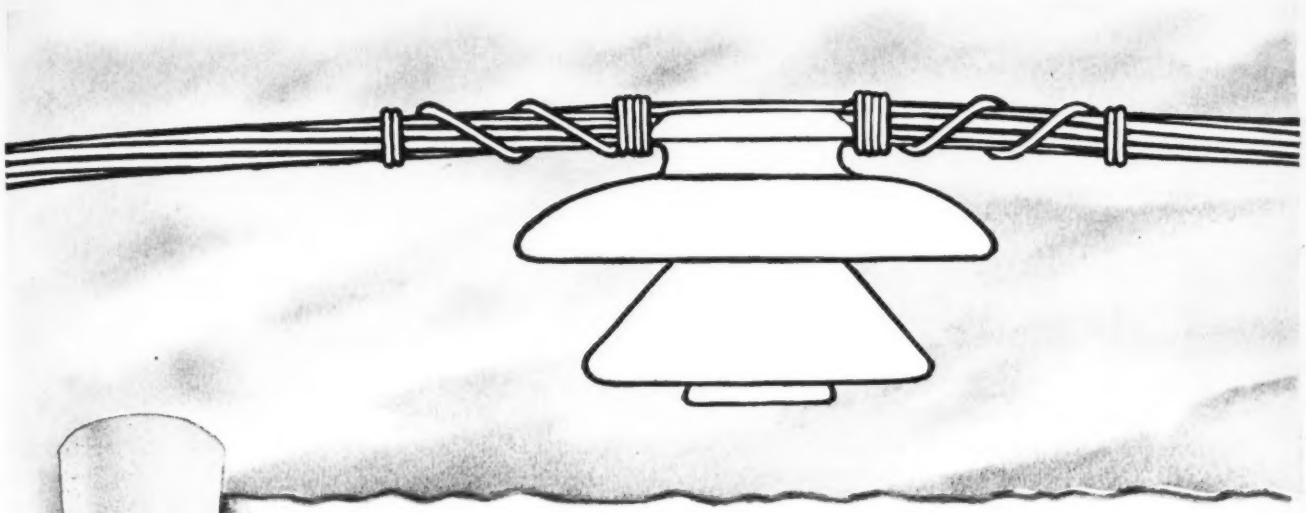
The PUD also seeks to acquire Clark County properties of Northwestern Electric and Pacific Power & Light companies.

Arizona Group Forms to Push Public Ownership

Arizona Public Power Assn. has filed articles of incorporation with the Arizona Corporation Commission as a non-profit association to push the fight for public ownership of utilities in the state.

It listed as its objective the obtaining of the largest possible use of cheap hydroelectric power from projects on the Colorado River, where Boulder and Parker dams already are producing power, and Davis dam, on which construction is to start soon.

The association was organized to carry on a publicity and advertising program in the state. Its president is C. C. Beddome, member of the board of governors of the Arizona Department of Mineral Resources and active in the Arizona Small Mine Operators Assn. Other incorporators are Clark Standiford of Buckeye and William H. Ford of Phoenix.



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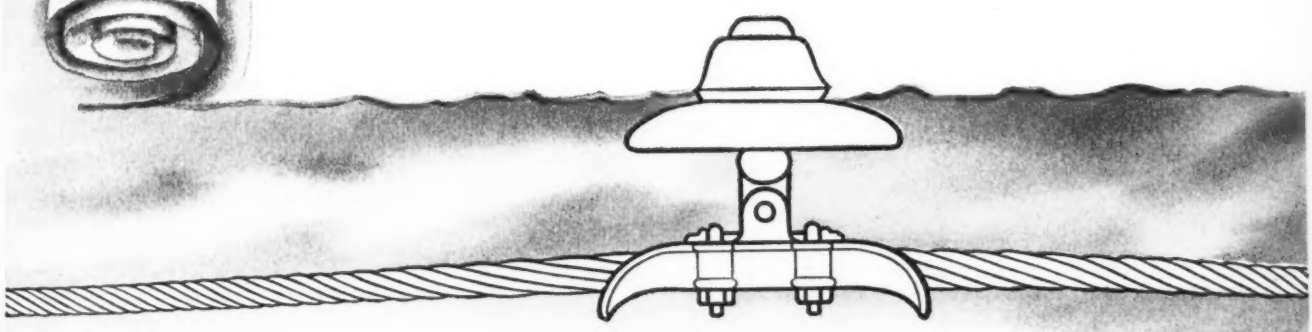

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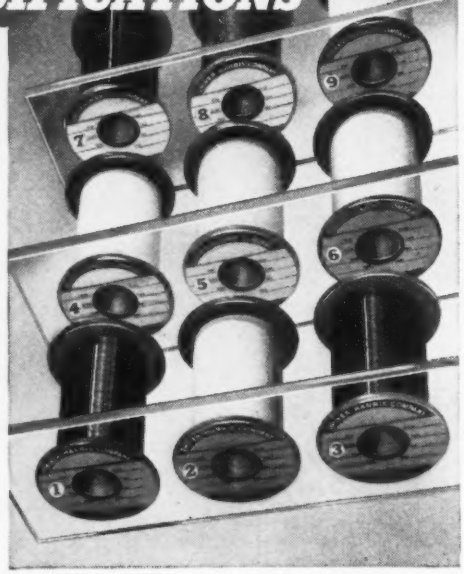

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Commission Turns Down Tucson Purchase Plan

Arizona Corporation Commission on Oct. 19 denied approval of Arizona Edison Co.'s plan to purchase properties of Tucson Gas, Electric Light & Power Co. Edison sought to buy the Federal Light & Traction Co. subsidiary for a price in excess of $8,500,000 (EWEST, October, p. 138).

Opposing the plan were the Arizona Power Authority, the City of Tucson and Trico Electric Cooperative, a recently organized corporation. They contended that the power authority plans to buy the Tucson generating plant for standby purposes and the transmission lines between Tucson and Nogales and Tucson and Fort Huachuca, so that it can serve southern and southeastern Arizona; that the City of Tucson wants to buy the distribution system in its metropolitan area and that Trico wants to buy rural lines, financing with REA funds.

On the following day, the power authority filed condemnation proceedings in Maricopa County Superior Court against Central Arizona Light & Power's steam generating plant, four miles west of Phoenix, and certain of the company's transmission lines in central Arizona.

In opposing the Edison plan, witnesses did not question the utility's management record during its ten years in the state but contended that, by eliminating corporation profits, they could provide lower power rates.

M. J. Dougherty, chairman of the power authority, testified that California public and private agencies are using Arizona's allotment of Boulder Dam power, reselling some of it to Arizona utilities. He said that the authority already has secured approval of a contract with USBR through which the state will recover the power and that the state must obtain a distribution system in order to reach its power markets.

Phillips B. Shaw, president of Arizona Edison, charged that the power authority's moves are designed to set up a political power trust in the state and declared that his company can serve the people cheaper than a municipality could.

Meanwhile, a group of Phoenix businessmen headed by Walter Bimson, president of the Valley National Bank, had pledged $1,250,000 to buy enough stock to establish local control of the utility, which is valued at $10,000,000 or more. This group would face a tough fight, it was believed, since both the Arizona Corporation Commission and the Arizona Power Authority had been granted permission to sit in at the sale and be heard by SEC.

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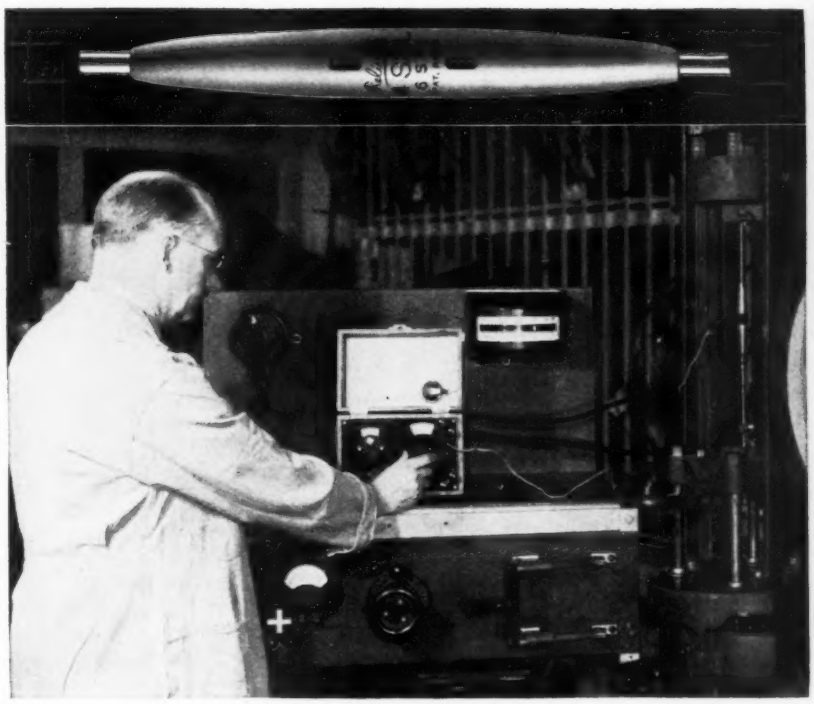

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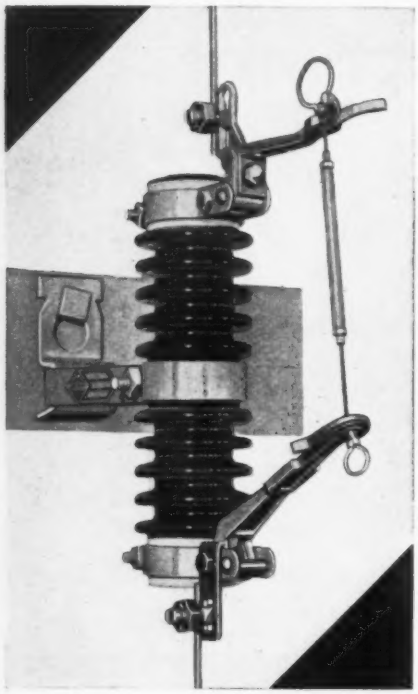

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BONNEVILLE IS MARKETING AGENCY FOR SURPLUS POWER

The Bonneville Power Administration has been designated marketing agency for all surplus electric energy from power projects authorized for construction on the Columbia, Willamette, Snake and Flathead rivers in the Pacific Northwest. Bonneville Administrator Paul J. Raver has been advised by Secretary of the Interior Harold L. Ickes.

Under Secretary Ickes' order, Bonneville will be responsible for marketing power from the Lookout Point, Quartz Creek and Detroit projects in the Willamette Valley, Ore., the proposed McNary Dam on the Columbia River and a number of projects on the Snake River. Responsibility for marketing power from the Hungry Horse project, which has been authorized for construction on the south fork of the Flathead River in Montana under the reclamation act, previously was assigned to the Bonneville Administration.

The order directs the Bonneville Administrator to integrate the power facilities of all projects for which he is the marketing agent of surplus power, to interconnect these projects with publicly owned power systems and to sell all electric energy in accordance with the policies of the Bonneville Act. The order makes the Bonneville administrator a member of the National Water Resources Committee, with authority to participate in surveys, investigations or studies affecting water power resources of the Pacific Northwest.

PG and E Has Approval on New Rate to Municipals

A new rate schedule applying to municipalities taking Pacific Gas and Electric Co. power on a five-year contract (EWEST, October, p. 132) was approved Oct. 16 by the California Railroad Commission. The new P-31 schedule, which reduces rates on an average of 9.8%, is available to all customers served under the P-6 schedule who will sign for five years.

Since the commission suspended the rate Aug. 27 for investigation, the order makes it retroactive to that date. Automatically put into effect by the decision are five-year contracts with Alameda, Biggs, Gridley, Lodi, Palo Alto, Redding, Santa Clara, Bay Point Light & Power and Vallejo Electric Light & Power companies.

In approving the rate and authorizing the contracts, the commission registered disapproval of contracts in general, pointing out that for many years it has taken the position that utilities should not require a contract as a condition precedent to obtaining service, except under special circumstances.

Meanwhile Roseville, which rejected the PG and E contract in favor of a ten-year contract with USBR for Shasta power, continued its fight for government construction of a publicly owned transmission line to serve northern California cities. The commission pointed out that Roseville's theoretical savings on the bureau contract probably will be nullified by necessity of contracting for standby power from PG and E until a means of delivering Shasta power is available.

FPC Experts to Survey Arizona Power Rates

Financed by a $50,000 appropriation passed by the state legislature, a survey will be made of Arizona power rates under direction of the Arizona Corporation Commission.

FPC participation was stipulated by the legislature and Wilson T. Wright, corporation commission chairman, last month invited commission rate experts to join in the investigation. Rate structures of Central Arizona Light & Power, Tucson Gas, Electric Light & Power, Arizona Edison and Arizona Power companies will be studied.

Legislative action came after a strong plea by Arizona Governor S. P. Osborn, who had carried on a four-year fight for the survey, contending that citizens of the state had no confidence in past surveys made by the corporation commission employing local engineers.

"Arizona now pays the third highest utility rates in the nation," Osborn said. "I think it is very strange in view of the fact we have so much cheap hydroelectric power available, but if I am proved wrong, I will publicly apologize to every utility in the state."

● USBR has prepared a 30-page booklet, *Putting the Missouri to Work*, which outlines a $1,500,000,000 construction program calling for cooperation of federal, state and local agencies. The publication is 9x11¼ in. and contains a three-color map insert. Copies may be secured through the Superintendent of Documents at 15c each, or $11.25 per hundred.

● APPLICATION has been filed by the Southwestern Public Service Co. with the New Mexico Public Service Commission for authority to purchase the Santa Rosa, New Mexico, electric and water utilities. The utilities are now owned by Robert K. Johnson, Oklahoma City, Okla. Proposed purchase price is reported to be about $147,000.

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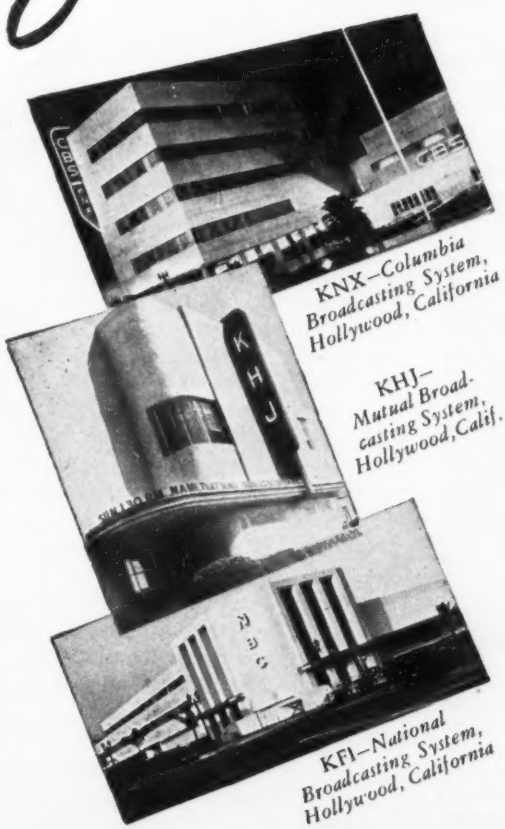

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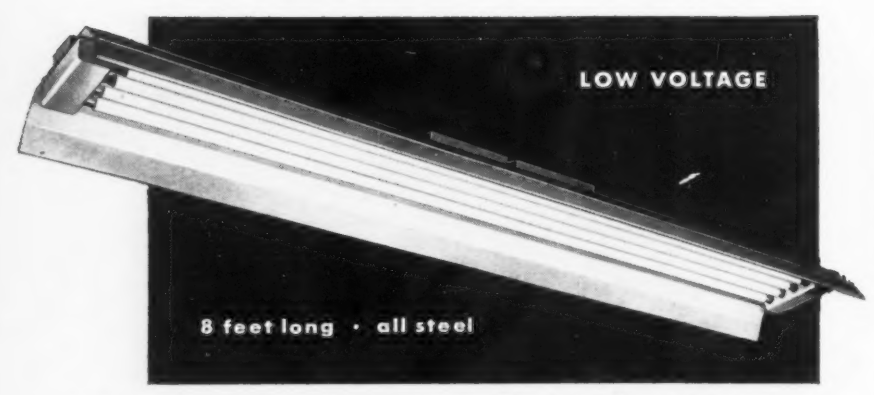
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SEEK FUNDS TO RESUME WORK ON USBR PROJECTS

Construction on California's Central Valley Project was resumed Oct. 15, when WPB restrictions on men and materials were lifted, according to R. S. Calland, USBR acting regional director.

Deficiency appropriations to permit full-scale resumption of work on CVP and other USBR projects were sent to Congress late in October. Major power item is a proposed $18,500,000 for Central Valley, which would boost funds available in fiscal 1946 to $34,500,000.

Of the requested new funds for Central Valley, $6,065,000 is earmarked for construction of the second and third 230-kv. transmission lines from Shasta Dam to complete the loop from the power stations to the Delta-Mendota Canal and to Central Valley's load centers, and a 115-kv. line from Keswick Dam via Sacramento to the irrigation pumping load center. Additional funds also are earmarked in the program for completion of power installations at Shasta and Keswick, including the transfer of the two Shasta units used at Grand Coulee during the war, and the erection of transmission switchyards for the entire project.

The acceleration proposed for Central Valley will bring the development to slightly more than 50% completion by the end of fiscal 1946, with $196,000,000 expended and $138,000,000 more needed to finish the job.

Other large chunks in the President's postwar power construction request of Congress include $10,000,000 for Davis Dam, $11,000,000 for Grand Coulee, which includes installation of additional generating units to replace the Shasta units and completion of Coulee's right power house, $7,683,000 for the Colorado-Big Thompson project, $1,925,000 for Anderson Ranch Dam and $1,500,000 for the Hungry Horse project in Montana, an adjunct of the Columbia River development.

● REA has approved a $110,000 loan for construction of a 30-mile power line from Oroville to Feather Falls, Calif., and a distribution system to deliver Shasta power in the area, according to announcement of Vernon B. Chamberlen, president of the Feather Falls Electric Co-op. Contract provides for repayment in 35 years, with five years of grace before the first payment is due; interest rate will be 2%.

Shasta power will replace electricity now generated by a small power plant burning sawdust and waste lumber. Three hundred families will be served over the new system.

THE GERMAN ECONOMIC PEACE HARD, SOFT... or WORKABLE?

IT is not surprising that difficulties are being encountered in spelling out the detailed terms of the German economic settlement.

The problem is exceedingly complex. The German economy is more or less inextricably bound up with the economy of continental Europe. Before the war that area—excluding the United Kingdom, Ireland and Russia—accounted for approximately one-fourth of the world's production, and for more than thirty-five per cent of world import and export trade. Germany's production constituted almost one-third of the output of continental Europe. It is obvious that the decisions we make now concerning the future German economy will exert profound influence not only upon the economy of Europe but also upon that of the world. It is clearly not practicable to plan for an expanding world economy unless provision is made for Europe generally to share in the development.

Despite the magnitude and complexity of the problems involved, it is crucial that we and our Allies come to swift and decisive agreement. Such agreement is important both to world economic reconstruction, and as a demonstration that those who won the war can reach accord on the terms of world economic rehabilitation.

We shall accomplish little if we continue to debate in terms of *adjectives*. Yet most of the public discussion to date has centered around whether or not the economic settlement with Germany should be *hard* or *soft*. To make progress we must focus instead upon *objectives*. A good program is one that will promote our objectives—a bad program is one that will not.

What Are We Trying To Accomplish?

Upon the economic objectives of the German peace settlement there is little fundamental debate. This is demonstrated by reference to a number of documents of recent release—the United States Directive to General Eisenhower of April 1945, the Report of the Tripartite Conference at Berlin of July, the Report of the American Advisors to the Office of Military Government of September. The latter document stresses fundamental difficulties in developing a practical program for carrying out the objectives of the other two, but it does not question their formulation of aims.

What are the objectives that we are seeking to forward:

1. The disarmament of Germany.

2. The elimination of German industries devoted primarily to armament production.

3. The assessment of reparations to compensate those nations which have suffered losses from German aggression through direct war destruction and through the German policy of confiscating industrial equipment to her own use.

How Far Are We Agreed on Procedure?

There is also a wide measure of agreement upon detailed procedure for carrying out these objectives. No one, of course, questions the policy of confiscating German arms. Equally, there is agreement that German industry devoted directly to the production of war equipment should be confiscated or destroyed, and that control measures should be instituted and sustained to prevent her from reconstituting such industries in the future. Since it is not practicable to prevent aircraft production and shipbuilding from being diverted to military use, these industries are included in the armament category. And similar reasoning generally extends the list of prohibited industries to ball bearings and abrasives.

There is an additional category of German production which all of the Allied powers agree should be uprooted and permanently barred. It embraces all economic activity which prewar Germany cultivated on an uneconomic basis through subsidy and other protection for the prime purpose of developing a self-sustaining economy to support aggressive war.

The major elements in this category are not difficult to define. A great German industry for the synthetic production of gasoline and other oil products from coal never operated upon an economic basis. The cost of such fuel products to prewar Germany averaged almost four times what it would have cost her to buy petroleum products in the world market. It is doubtful whether these plants could be operated postwar at a cost much below three times the world market price for competing petroleum products.

A similar situation applies to German synthetic rubber production. In an attempt to free herself at least partially from dependence upon supply lines, she produced synthetic rubber at a cost at least double the world market purchase price. Similarly, she protected or otherwise subsidized a considerable agricultural production, particularly in grains, for which her lands were so ill suited that Germans had to pay for German-grown wheat from three to four times the world market price.

These are merely outstanding examples. The maintenance of such activities in Germany constituted a drain upon the German economy rather than an advantage other than that of preserving a self-sufficiency necessary for war. Hence their elimination is clearly indicated, and generally subscribed to, though the job of defining a complete list is far from easy.

What Is The Area of Dispute?

Unfortunately, this total catalogue of agreed-upon measures is not sufficient to provide either adequate security against a resurgence of German militarism or satisfactory restitution to her European neighbors for Germany's ruthless destruction of their industrial plant and equipment. To serve these two ends it is necessary to cut down the margin of German dominance in heavy industry—in steel, in electric power, in machine tools, and other industrial equipment. Unless such steps are taken, Germany will emerge from the war with sufficient industrial power to provide a continuing and perhaps uncontrollable military threat; and we should be perpetuating a dominance that was developed, as a matter of German strategy, far beyond the requirements of her civilian domestic markets or the export potentials of normal trade.

German steel capacity was built to a wartime peak of twenty-four million tons a year. Before the war she had accumulated a store of machine tools greater than that of the United States, and her present stock of some four or five million tons of such tools is second only to ours. There is little debate over the necessity and justice of cutting down the margin of German dominance in heavy industry, particularly since it was built to its current levels through aggressive economic warfare to serve as an instrument of actual warfare. It is recognized, too, that in this sector of the German economy will be found the most useful reparations in kind for the countries damaged by German aggression.

The question is how much heavy industry and electric power equipment should be taken from Germany and transferred to others. The Russians, having experienced colossal war damage, are demanding very severe assessments. They talk of reducing postwar German steel capacity to three million tons annually.

The United States inclines to assessments in this field of less extreme dimension—we have suggested leaving in Germany an annual steel capacity of from seven to ten million tons. We naturally are concerned lest action be taken that will cause a complete breakdown of the German economy. If this should happen while we maintain occupational forces there, we should feel responsible for seeing that the Germans within our jurisdiction are provided with at least the means for subsistence. Furthermore, both we and the British know that in the long run our peoples will not support control measures over Germany which go beyond our concepts of reasonable fairness consistent with security requirements.

It is no part of our intention, as has been suggested by some, to provide for a German economy that will serve as a buffer against Russian expansion. We know, however, that our weakest course would be to commit ourselves now to continuing control measures which our people would later repudiate as falling outside democratic concepts of justice. On this issue we cannot, and should not, compromise.

How Can We Resolve Our Differences?

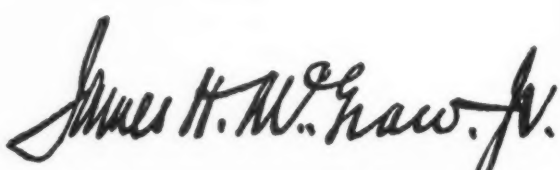
The best chance for resolving the differences which have appeared between the Russian position on the one hand and the American and the British position on the other lies in making a sharper distinction than has appeared in current discussion between long-term and short-term control decisions. All of us are agreed upon the policy of wiping out German military production and that part of German economic activity which has been run at economic loss to provide for a national self-sufficiency useful only for war purposes. But we are unwilling to enter into long-term commitments for holding down those parts of the German economy that do not constitute a war threat. That would unduly penalize future generations of Germans and drag down the whole economy of continental Europe.

It should be possible to reach agreement that measures for cutting down German heavy industries and power-generating facilities are immediate measures, and that no attempt will be made to sustain such controls over an extended period. If part of the German establishment in these fields is transferred to countries whose manufacturing resources have been damaged by German aggression, it can serve the purpose of effecting a reasonable balance without destroying utterly incentives for a new generation of Germans to improve by peaceful methods their status in a peacetime world.

Such a program is consistent with the concept of building a healthy and balanced European economy in which general economic interdependence provides one of the essential safeguards against a resurgence of German militarism. We must still face the problem of agreeing upon how far the non-armament segments of German industry can be cut back at the present juncture without leading to disastrous breakdown with its resultant chaos. Such definition, though formidably difficult, should not be beyond the capacities of the nations whose combined might brought victory, and who have the strongest of incentives for devising a lasting peace.

The key to agreement lies in each of us doing his best to understand the position of the other. Russia must recognize that we cannot get our people to subscribe to the permanent repression of a European economy which would deny to millions of people any hope of normal economic betterment. We should try to understand Russia's conviction that she is entitled immediately to reimburse herself for her war losses by drawing upon the German industrial establishment that still exists. It will help to resolve our differences if we separate in our thinking steps that require permanent controls from those which are merely temporary expedients.

Neither of us will be forwarding our ultimate and common objectives if we impose controls that blight the development of so large and important a segment of the world as continental Europe. In such a blight lies the germ of a Third World War.



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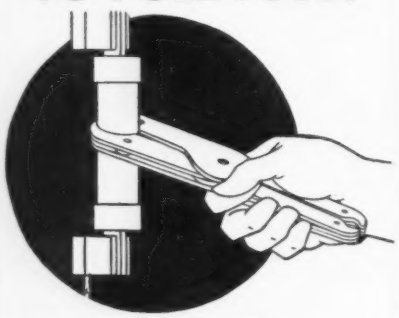

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PG AND E UNDERTAKING RURAL EXTENSION PROGRAM

Electrification of virtually all farms and rural areas in Pacific Gas & Electric Co. territory throughout northern and central California will be completed by the end of 1946 or early 1947 under a $6,000,000 line extension program now under way.

Involving more than 1,200 extension projects which will aggregate about 3,000 miles, the program will provide electrical service for about 10,000 new customers in comparatively remote or isolated regions. It will complete the rural electric network of the company which already serves electricity to 91% of the farms within the 46 counties in which it operates.

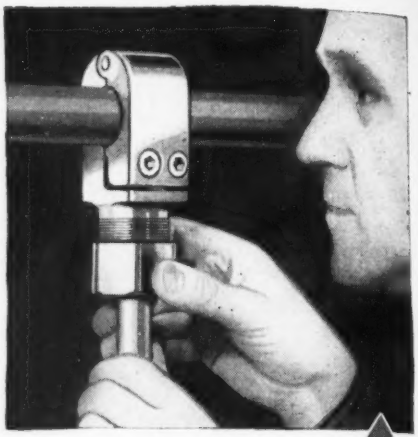
To obtain the skilled men required for the construction project, PG and E conducted a special training school at its Davis construction depot. Candidates were given two weeks of instruction and practical experience in putting up poles and installing crossarms and insulators, rigging, handling and splicing all types of conductors, securing conductors to insulators, first aid and safety first. At the end of the course they went to work as apprentice linemen and, after actual experience in line construction, they will receive advance training, according to company officials.

USBR Tells Plans for Heart Mountain Project

A 15,000-kw. hydroelectric plant, costing about $900,000, will be constructed by the Bureau of Reclamation 3 miles downstream from Shoshone Dam in northern Wyoming, Commissioner of Reclamation Harry W. Bashore announced early in October. Construction on the project, known as the Heart Mountain power development, will begin when funds are made available.

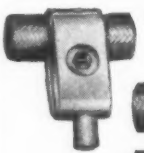
Discovery of new oil fields in the Elk Basin area, north of the Shoshone project, has stepped up loads of oil drillers and pumpers in the territory. It is estimated that the cost of constructing the plant would be paid back at the end of 16 years of operation.

● PLANT EXTENSIONS during the first eight months of 1945 called for an expenditure of $1,062,000 by the Mountain States Power Co., it was reported in the company's recent report to stockholders. The company's $7,500,000, 4½% bond issue has been refunded by the sale of an issue for a like amount bearing 3% interest, due July 1, 1975.

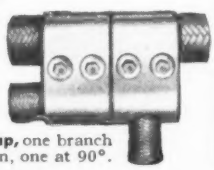


It's Easy to pick the right CABLE TAP — from the *Complete* line

You'll find the widest variety of parallel and 90° taps, combinations, and gutter taps — in a range of sizes up to 1,000,000 cm. Insulating Bakelite covers can be furnished for all types.



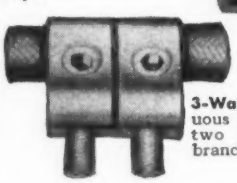
Single 90° Tap from main conductor.



Combination Tap, one branch parallel to main, one at 90°.

2-Way Gutter Tap.

Bakelite Covers can be furnished for all types of Penn-Union cable taps.



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POWER DELIVERED FROM NISQUALLY'S ALDER UNIT

First power was delivered from Tacoma's Second Nisqually Project in October, when the new 40,000-kva. machine at the LaGrande unit went on the line. Four generators in the original LaGrande power house bring capacity to 64,000 kva.

Alder power plant, also part of the Nisqually development, is nearing completion, with one of two 25,000-kva. generators scheduled for operation Nov. 1 and the other by mid 1946.

Plagued by misfortunes and delays, the development was started 3½ years ago as a $11,000,000 project, cost $23,651,000 before completion.

Commended by Commissioner Erdahl of the department of public utilities for their part in the development were J. V. Gongwer, chief engineer construction, H. A. Cole, office engineer, and A. D. Francis, chief electrical engineer, design and construction, all City of Tacoma officials. Also noted were George A. Gregory, construction engineer, Alder dam and power house, and Floyd E. Rogers, construction engineer, LaGrande dam, tunnel and power house, as well as L. E. Dixon of the L. E. Dixon Co., contractors, project manager.

● First Unit of the high-voltage transmission line from Las Cruces to Alamogordo, N. M., was scheduled to be completed and carrying power in mid-October. The unit extends from Las Cruces to the Army's White Sands Ordnance Proving Grounds, a distance of about 30 miles. When completed, the 70-mile line will carry current from Elephant Butte Dam to the Army Air Field near Alamogordo and to rural areas in Otero and Lincoln counties. Construction was started Sept. 1.

● Imperial Irrigation District will seek approval of a $6,200,000 bond issue to finance its 1945 power development project. The organization's board of directors recently approved the engineering report of M. J. Dowd and Lester S. Ready and requested California Districts Securities Commission for approval of the project and authorization to call an election on the bond issue.

● In A Booklet entitled, *A Plan Taking Shape Today*, B. C. Electric Railway Co. makes a progress report to the public on plans for its $50,000,000 expansion program previously announced. The booklet was sent to employees with a letter, giving supplementary information and asking for comments or suggestions.

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PVX cable is composed of thermoplastic insulated conductors protected by an improved crushed-paper armor and covered with a tough over-all braid. The whole assembly can be freely stripped. The insulation of the conductors has long life, is high in dielectric and mechanical strength and is resistant to oil, acids and alkalies. Both this insulation and the over-all braid are flame and moisture resistant.

ADDITIONAL INFORMATION

For further information see the nearest G-E Merchandise Distributor or write to Section W1151-18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

Make all taps "hot" with TIPS clamps and clamp sticks

Tap on to steel, copper or aluminum conductors while lines are still energized. Tips Tap Clamps make a tight, positive contact that will not jar loose, but does not stick and can be removed "hot" with a Clamp Stick. Write for details of types and sizes.

Complete equipment for making hot tap connections should include the Grip-All clamp stick—available with either set of jaws as shown above. The hand grip will open and close the jaws to contact the clamp, close on the eye screw and pull the clamp into the head to make a rigid unit for applying the clamp to the conductor. Write for detailed information.

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REA RELEASES REPORT ON UNELECTRIFIED FARMS

Estimates on number and per cent of unelectrified farms in the nation and REA allocations by states have been released by REA administrator Claude R. Wickard. Figures for the West are:

STATES	Farms without Central Station Electric Service, July 1, 1945 Number	Per Cent	Loan Allocations for fiscal year ending June 30, 1946
Arizona	10,218	55.3	$303,098
California	10,458	7.9	310,217
Colorado	26,136	50.8	775,276
Idaho	9,563	21.9	283,668
Montana	30,473	72.9	903,924
Nevada	1,713	47.9	50,813
New Mexico	26,705	78.3	792,154
Oregon	12,429	20.1	368,683
Utah	5,411	21.3	160,507
Washington	13,386	16.4	397,071
Wyoming	9,468	63.0	280,850

Utility Men Testify at Hearings on REA Bills

Representatives of the Idaho Power Co. were among those testifying last month before a House Inter-state Commerce subcommittee in hearings on the Lucas and Poage bills affecting REA. A co-op, a municipal utilities association and members of the electric industry expressed opposition to REA's $550,000,000 construction program to be completed in three years.

Ralph E. Gale, general sales manager of Idaho Power, told the subcommittee that his company had engaged actively in rural electrification in its southern Idaho-eastern Oregon territory since 1916 and, in 1940, between 85 and 90% of all farms with occupied dwellings valued at more than $500 were served. This, he pointed out, is about twice the national average.

Other witnesses claimed that REA can complete its share of the remaining feasible rural line construction with the $300,000,000 it had in appropriations and unexpended balances at the start of the present fiscal year, and urged co-operation between the administration and power companies. The representatives of the co-op and municipal association claimed that co-ops need protection from REA sponsored projects which leave them with heavy debt burdens and protested against extension of co-op-owned generating plants.

● Mountain View Electric Assn., Limon, Colo., has awarded a $353,486 contract to the R. N. Campsey Construction Co., Denver, for construction of 392 miles of line to serve 399 members. Flora Engineering Co., Cheyenne, Wyo., is engineer.

● Surprise Valley Electrification Corp., Alturas, Calif., has awarded a $6,856 contract to Emmett Brown, San Leandro, for labor on 8.6 miles of line. Materials will be furnished by the co-operative.

Hunters who bag more poles and insulators than game have become a real problem in the Salt Lake Area. Here Lee York, Utah Power transmission department line foreman, holds 56 empty shotgun shells, which had been fired at point blank range until a communication pole was cut in two

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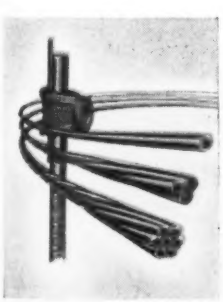
Saw cuts were made radially at several points completely through the copper and into the alloy steel. The segments were bent backwards and forwards until fracture resulted. The copper broke under repeated bending but not once did the break occur in the area of the molten-weld.



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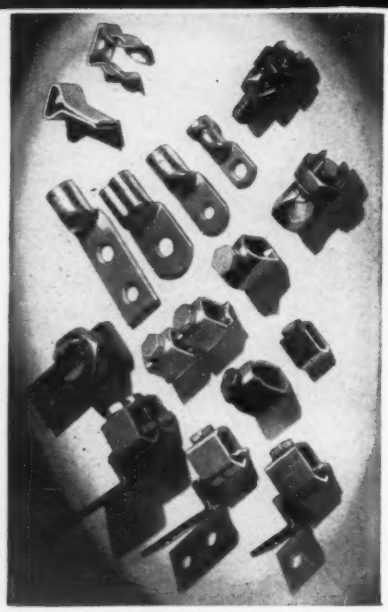

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WWP STARTS EMPLOYEE EDUCATIONAL COURSES

As a result of employee requests, Washington Water Power Co. is considering a series of educational and training classes through the winter months.

Strange though it may seem, the company reports, public speaking is one of the most popular subjects, and what's more strange, the girls in the company ask for it even more enthusiastically than do the men. This public speaking class started Oct. 1 with an outside instructor. These meetings give men and women alike a chance to talk about ordinary, everyday subjects and give practical suggestions as to effectiveness of delivery and logic in presenting the main idea.

Other top subjects of interest to employees are electricity and human relations. A trial class in human relations will be started Oct. 6 with a very limited group, as the classroom can accommodate only so many people and there are many in supervisory capacity who desire to take the course. It is hoped that it may be expanded for other employees later. In answer to the demand for information on electricity, such a course is scheduled to start Jan. 5, 1946. This will be an extension of two earlier classes conducted on electricity and electronics.

Recently 33 department heads, division managers and supervisors attended a two-day session on conference procedure sponsored by executive officers of the company. The meeting was conducted by William Toy of the Spokane Trade School, and open discussion made it evident that frequent meetings with employees, if properly conducted, will help to keep them acquainted with company problems and will do much to enlist cooperation.

● UNDER PROVISIONS of a bill amending the Bonneville Act, Bonneville Power Administration became the first regular federal agency to extend retirement protections of the Social Security Act to laborers, mechanics and workmen not subject to the civil service retirement act. Unemployment compensation is provided in the law for Bonneville workers employed on a temporary basis. Other amendments to the Bonneville Act are designed to enable the agency to function as a regional agency, with authority to deal with problems locally.

● OREGON COALS for industrial carbon production will be studied as the first in a series of industrial research projects to be undertaken jointly by Bonneville and Northwest educational institutions. Oregon State College is cooperating in the study.

BOND ISSUE UP FOR BIDS UNDER COMMISSION RULING

Pacific Gas and Electric Co. must call for competitive bids on its proposed $49,000,000 refunding bond issue, under a California Railroad Commission decision handed down early last month. A seven-month controversy had existed between PG and E, who wanted to negotiate with Blyth & Co., and Halsey, Stuart & Co. of Chicago, who desired the market opened.

The commission for several months has been considering evidence on whether or not to change its long-established policy and make competitive bidding compulsory. The vote in the PG and E case was three to one, with Ira H. Rowell dissenting on grounds that "in fairness of the particular utility applicant, the commission should either candidly state why competitive bidding is deemed to be a prerequisite to issuance of its securities or it should announce now that the intention is to apply a similar rule to all."

IBEW Will Represent Commercial Employees

The International Brotherhood of Electrical Workers, AFL, has been certified by the National Labor Relations Board as exclusive representative for employees of the commercial department of the Southern California Edison Co. for collective bargaining on pay rates, working hours and conditions. The IBEW won an election 82 to 46.

NLRB also ordered an election to be conducted not later than Nov. 11 to determine whether employees of the Tillamook plant of the Mountain States Power Co. shall be represented by Local Industrial Union 1361, CIO, or by the International Union of Operating Engineers, Local 87, AFL. Approximately twelve employees of the steam plant at Tillamook are involved. The case was begun by the CIO Industrial Union and the AFL union intervened.

● To CHECK corrosion of water pipes caused by electrical currents, the City of San Diego has employed Enoch C. Burgess, cathodic protection engineer, to install and maintain cathodic protection equipment. For the past six years Burgess has been with the San Diego Gas & Electric Co., where he aided in the installation of forced drainage systems, corrosion test facilities, and conducted both erosion and corrosion studies on gas lines, gas, steam and underground power lines. He has also aided in research on stray current electrolysis.

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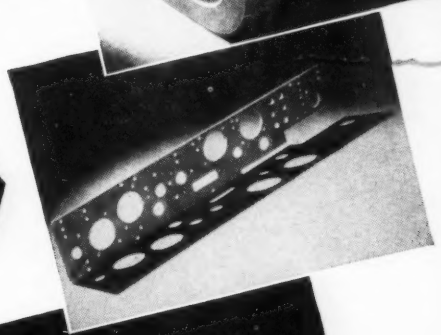
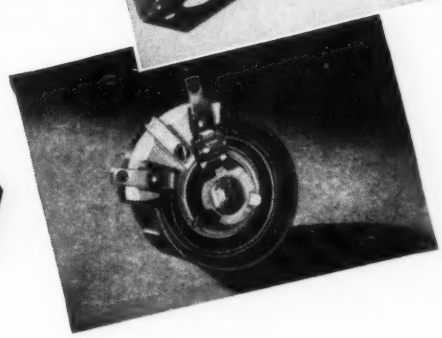


RHEOSTATS?



Probably each of these questions would be relatively easy to answer if all the specifications and the available materials were known. It's easy too when you contact Mica Insulator Company who have available a complete line of all types of insulating materials.

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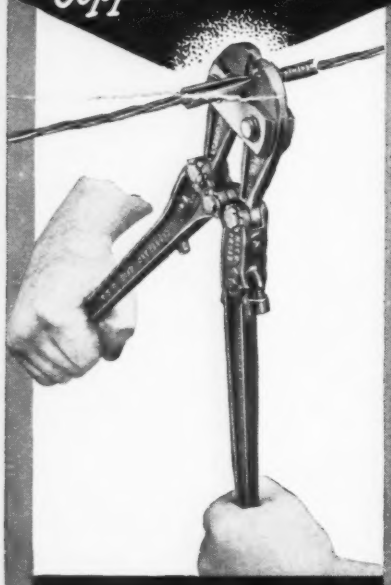

Nicopress Reinforcing Sleeves offer an ideal means of strengthening Copperweld-copper conductors at points where one or two of the copper wires have been damaged. These sleeves are split the full length and may be slipped over the damaged section and compressed with the same Nicopress Tool used in making the regular line splice.

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PEOPLE

made this news

● L. A. BUESE became vice-president and executive engineer for Hawaiian Electric Co. in organization changes made by the company directors. Buese, former electrical engineer, also was made a director. He will have charge of engineering, construction, operation and maintenance. Reporting to him will be EMIL OLSON, manager of the generation department; JAMES P. MICHELS, manager of distribution; LEWIS LENGNICK, design engineer; HERBERT HEINRICH, manager of the general construction department; WILLIAM L. MCCABE, who has returned from military leave, manager of the general service department.

● LOYD B. REED, assistant auditor for California Electric Power, has been promoted to the post of auditor, replacing J. S. BORDWELL, resigned. ● LT. COL. J. E. UNDERHILL recently concluded his war service and returned to B. C. Electric's engineering department. He reports that ELECTRICAL WEST followed him during his service and always gave him the desire to head back West as soon as hostilities had ceased.

● W. C. MAINWARING, former vice-president in charge of sales for B. C. Electric, has been made Vancouver Island vice-president of the company and will move to Victoria, headquarters of the territory. He succeeds ALBERT T. GOWARD, who retired as a result of ill health. ● A. W. SMITH has been named B. C. Electric's director of merchandise sales for Vancouver Island. He has recently been released from the RCAF, where he had the rank of squadron leader.

● TERRY PHILLIPS has been released from the RCAF and has rejoined the staff of Phillips Radio Shop, New Westminster, B. C. ● R. R. DOUGLAS has been appointed general manager of Mid-City Industries Ltd., Vancouver, furnishing service in automotive, marine, industrial, electrical and home radio repairs.

● NORMAN B. NEELY, during the war associated with Western Electric as special field engineer engaged in confidential work on AAF equipment contracts, has resumed active management of Norman B. Neely Enterprises, Hollywood. ● ROBERT BROWNING has been appointed special field engineer for Neely Enterprises. ● C. J. STEVENS has been named a regional manager in Crosley's manufacturing division sales department. Colorado and part of Wyoming are in his eight-state territory.

Buese

● G. PAUL EVANS, for ten years district manager of San Diego Gas & Electric's San Juan Capistrano office, has been made district manager of the Oceanside territory to succeed A. R. WHISLER, retired after 22 years there. LLOYD M. WALL goes to San Juan Capistrano. ● CORRECTION: Instead of merely becoming manager of the Las Vegas Light & Power Co. to succeed the late E. A. Bradner, it now appears that Lt. Col. LEWIS G. FRANTZ has been appointed president and general manager, also acquiring the same titles with the Agua Pura division of the New Mexico Power Co.

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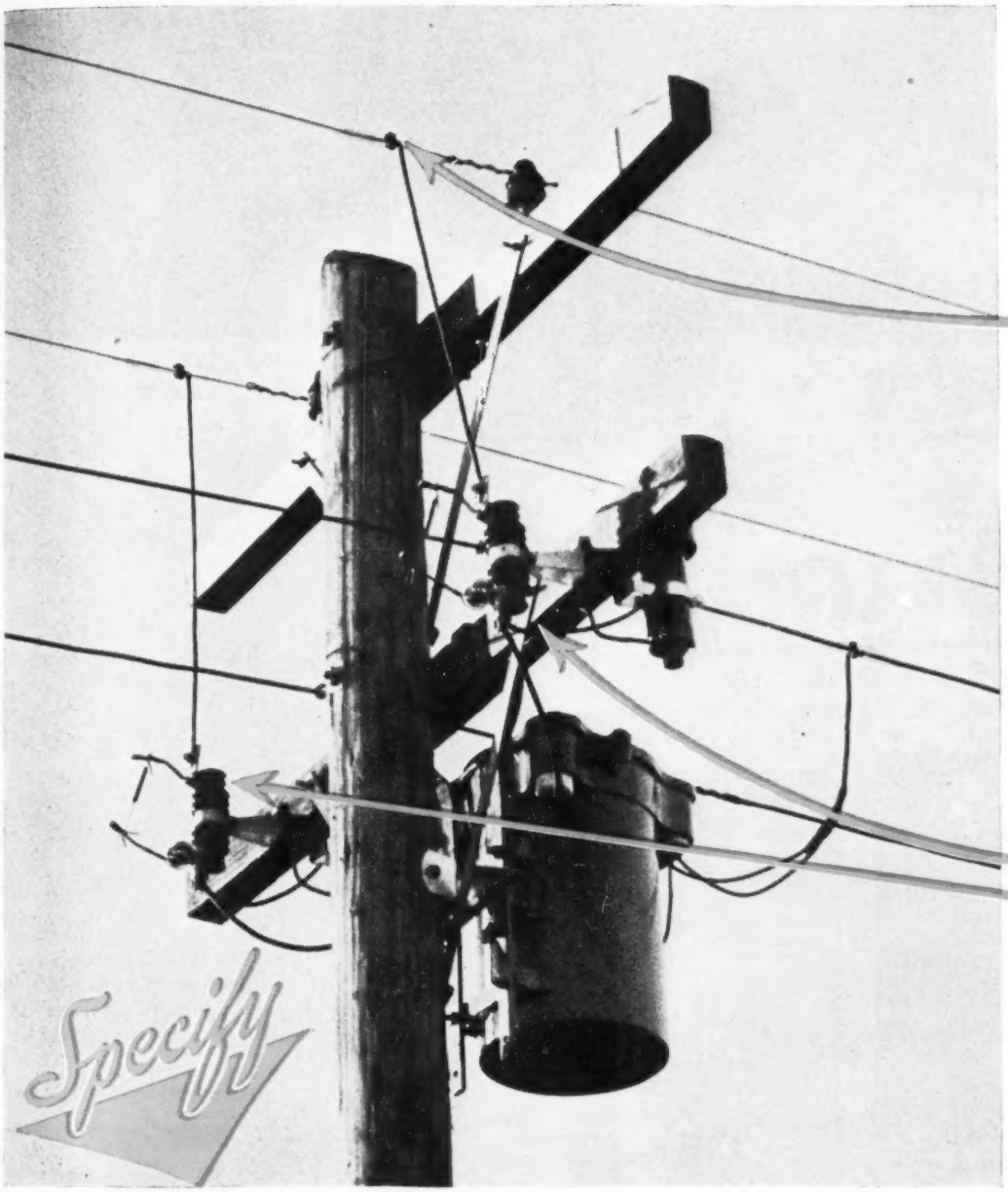

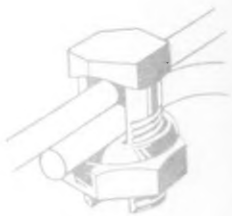

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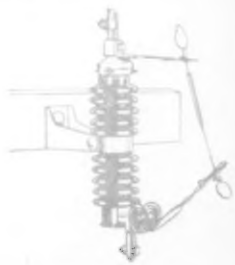

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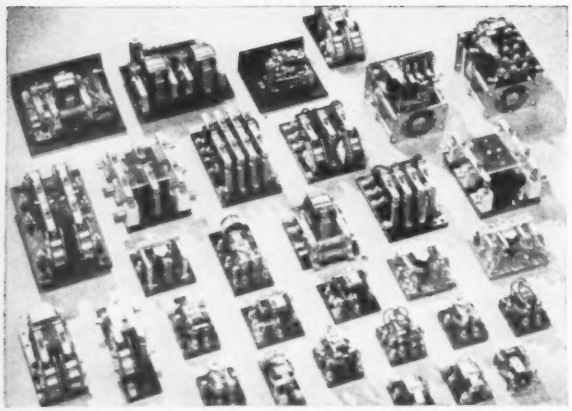

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Bulletin 362 — Motor Driven Time Delay Relays for operation on alternating current.

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Bulletin 106—Midget Relays for light duty available in single and double pole, single and double throw.

Bulletin 81 — Intermediate Duty Relays in single and multipole arrangements, single and double throw.

Bulletin 104 — Midget Relay for tight places—Vibration resistant — Double Pole, Double Throw—Available for 6 to 115 volts A.C. or D.C.

Bulletin 131 and 132 — Heavy Duty Relays single and multipole, single and double, contacts rated up to 25 amp. on 125-250V.

Bulletin 251 — Sensitive Type Relays for direct and alternating current operating on .014 watts.

Bulletin 103 — Aircraft Power Relay. Single Pole, Single Throw for 24 volts at 25 amps. D.C. Withstands high values of acceleration of gravity, shock, and vibration.

WARD LEONARD RELAYS include types and sizes for every application. They all have crisp action, are dependable and durable yet consume but little current. Send for the data bulletins of interest to you.

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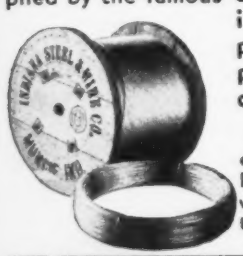

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The States Company
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Boke

● RICHARD L. BOKE was appointed regional director of the USBR Region 11 at Sacramento, succeeding the late Charles E. Carey. A native of California, he is a land use specialist and for the past eight months has been supervisor of operation and maintenance in the region. Before joining the bureau, he was connected with the Foreign Economic Administration in charge of food production in Latin America.

● J. E. GRANNIS has joined Westinghouse as sales development manager for the electric appliance division, Pacific Coast district. He was with General Electric for nine years, then spent three with Landers, Frary & Clark on the Pacific Coast and more than a year with Dalmo-Victor.

● E. W. ISENHOWER has been made southern California manager of the Westinghouse home radio division, with headquarters in Los Angeles. He

Grannis

had been district merchandise manager for Westinghouse Supply, serving Arizona, California, Idaho and Utah.

● MARSHALL LASHER will serve as assistant to W. W. Glosser, vice-president of Hubbard & Co., Pacific Coast division, with headquarters at Oakland. Lasher has been at the Pittsburgh headquarters of the company for 23 years. ● ARTHUR J. TURNER, consulting engineer, who retired from Washington Water Power Co. after 31 years of service, was honored recently at a dinner in the Spokane City and University Club. J. E. E. ROYER, WWP vice-president and general manager, presented him with a diamond rotary ring in honor of his service to the company. ● EDITH T. RAUGH, Puget Sound Power & Light home service director, was again a winner in the Laura

Lasher

McCall award. She won third prize this year.

● COMMANDER FRANCIS M. FALGE, former G-E district engineer at Los Angeles, has been released from the Navy and returned to the company at Nela Park as lamp sales specialist. ● Appointment of EDWIN M. AMES as Sacramento manager for G-E Supply has been announced. ● DON W. RENNEWANZ, former Hotpoint range and water heater specialist at Seattle, has been appointed sales manager of the company's range division.

● A. W. UHRICH last month became stock transfer agent for Pacific Gas and Electric, replacing CYRIL E. HOLT. Holt retired Oct. 1 following 55 years of service. PG and E has named HARRY A. LEE sales manager of the San Francisco division, effective Jan. 1. He will succeed FRANK TALCOTT, who is retiring after 39 years with the company. ● E. C. WATSON of the California Institute of Technology's physics de-

SMOOT-HOLMAN COMPANY
INGLEWOOD, CALIFORNIA

An open letter to
the Electrical Industry:

Conversion from war to peace production may seem a simple process, but when a plant has been devoted 100% to war work there are many problems which must be overcome.

Smoot-Holman has always stood for the finest in illumination and mechanical construction of lighting equipment. Consequently, rather than to rush conversion and give the public a substandard product, our decision is to take the necessary time to produce equipment, not only equal to, but better than that supplied in the past.

If you are unable to wait for Smoot-Holman quality, avoid lighting failures and high service costs by purchasing industrial equipment with the RLM label or commercial equipment with the Fleurolier label, which assure reliable performance.

Yours very truly,

C.E. Smoot

C.E. Smoot
President
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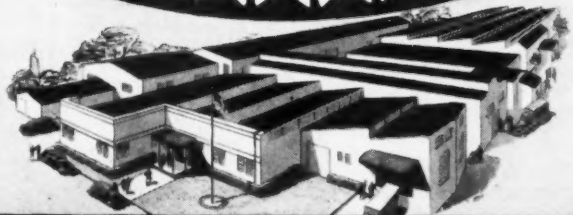

Offices in Principal Western Cities—Branch and Warehouse in San Francisco

Culbert

partment, was appointed dean of the faculty.

● FRANK G. MACKANESS has been made agricultural consultant for Portland General Electric Co. ● LT. COL. CHARLES P. CULBERT has returned from three years with the Army Air Force and has been reappointed Western regional sales manager for Proctor Electric Co. From Los Angeles headquarters, he will handle all or part of 17 states. Under him will be J. C. IVY at Denver, AL SNYDER at Seattle and TRUMAN W. BALL at San Francisco.

● JAMES H. TURNER will succeed EDWARD C. CAHILL as director of San Francisco's utilities and AXEL O. OLSON will succeed Turner as general manager and chief engineer of the Hetch Hetchy system. Before joining the city staff, Turner was with PG and E. Olson started with the city in 1926 as assistant electrical engineer; was in charge of street and building lighting from 1936 to 1942, when he became general manager and chief engineer of the light, heat and power bureau. ● A. V. YOUENS has resigned as electrical engineer for the City of Palo Alto, following 36 years of service, and will be succeeded by C. C. SMITH, the title having been changed to city electrician.

● RALPH H. STROUFE succeeds J. W. O'Neill, resigned, as manager of the Portland branch of Westinghouse Supply. A native of Washington, Stroufe went in the electrical wholesaling business in Seattle in 1915. He was moved to Portland from Des Moines. ● LEO W. FERNANDES, formerly with Montgomery Ward, is now Seattle district sales promotion manager for

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8153

Westinghouse Supply. ● In other changes in the supply company's Seattle office, COMMANDER JOHN L. WALKER, USN, has been made district radio manager; R. S. SLOAN, appliance sales supervisor, succeeding Ross Vieths, resigned; PAUL K. CARLSON has been promoted from Seattle service manager to North Pacific district service manager. ● Having had twenty-five years continuous service with Seattle City Light, FRED KNAUS has retired as industrial sales engineer. He is an authority on electric rate structures and his files have been consulted by numerous institutions in many sections of the country.

DEATHS

Frank Angle

Frank Angle, recently promoted from a series of well-deserved upward steps with Allis-Chalmers Mfg. Co. on the Pacific Coast to be manager of district offices in Milwaukee, died Oct. 25 in that city, after several months' illness, of leucomia. Friends have thought that perhaps he gave too generously for his own good to the blood bank as one of many contributions he made to the war effort.

Native of The Dalles, born Oct. 1, 1900, a graduate of Oregon State College, he had served in submarine service during World War I. His first job was with the Elliott Co., as engineer, and later he joined Allis-Chalmers as sales engineer in the Chicago office. In 1934 he was sent to San Francisco as sales engineer; in 1936 became San Francisco district manager; in 1943 Pacific Regional Manager and in August 1944 was taken to Milwaukee as manager of district offices. While on the coast he often worked hard and long aiding the Navy get ships under repair back into service. Once he even went to sea on a vessel he was working on and was mistakenly brought back as a stowaway.

In the industry he served in many associations, heading the Pacific Coast Electrical Assn. as its president in 1943-44, and the San Francisco Electric Club as president.

Frank Angle

● FRANCIS H. BAXLEY, 58, electrical supervisor for 20th Century-Fox studios, Los Angeles, died at the studio Sept. 28.

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Here are two first quality Poultry House Time Controls. Paragon "PS" models are designed for both morning and evening lighting, with dimming period for roosting. The Paragon Model 301 is designed essentially for morning lighting only. It is a heavy duty, industrial type time switch adaptable to poultry house lighting.

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Paragon has prepared a 4-page, 2 color bulletin containing authoritative information relative to poultry house lighting control. It summarizes the recommendations of leading poultry authorities and gives complete data regarding the wide range of Paragon poultry house time switches. Send for a supply to distribute among your dealers and power companies.

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TRADE *notes*

Roller-Smith Re-enters Breaker Business

Recent tests before AIEE and NEMA engineers of a newly designed product marked re-entry of Roller-Smith into the oil circuit breaker business after a war absence of two years. The new line of breakers designed by Prof. A. R. Miller, development engineer for the company, is known as the TCR-5 series and embodies the "Exotherm" arc quenching principle to interrupt their full short circuit rating within five cycles.

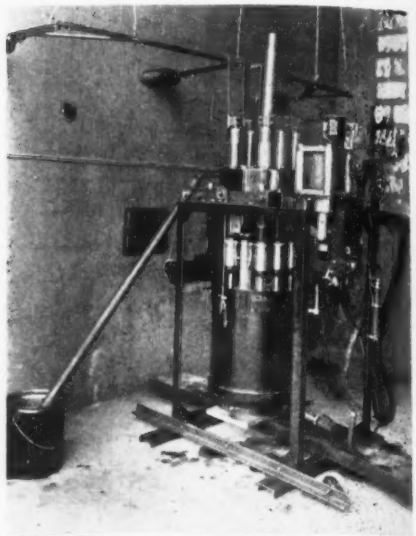
The 100 TCR-r model, rated at 7.5 kv., 600 amp., 100,000 kva., broke 9,530 amp. and 121,000 kva., and the 150 TCR-5, rated 15 kv., 600 amp., 150,000 kva., broke 6,290 amp. and 159,200 kva., in the series of tests conducted at the Roller-Smith "on-the-line" testing laboratory at Siegfried, Pa. First Western installation of the new oil circuit breakers will be at Camp Pendleton, Oceanside, Calif.

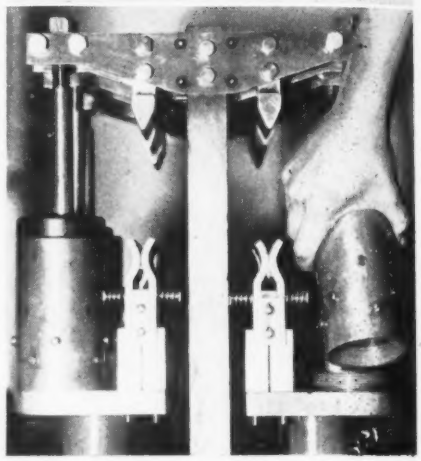
Brown-Johnston Plans Extensive Remodeling

The Brown-Johnston Electric Co., Spokane, the president of which is the well-known president of the United States Chamber of Commerce, Eric A. Johnston, has announced that it will institute a program of extensive remodeling and redecorating. The announcement of the program which will prepare the store for merchandising the electrical appliances, expected to return to the local market within the coming weeks, was made coincident with the recent announcement that Eric Johnston had been chosen as the "movie czar" of America to succeed Will Hays.

Active management of the Spokane retail store is under the charge of John F. Boothe, Johnston having spent most of the past years in many parts of the world and now expecting to divide his time between Washington, D. C., and Hollywood, although it is understood that he will still maintain Spokane as his home.

Remodeling work is scheduled to begin at the earliest time it can be arranged. It will include the installation of modern demonstration units for many leading lines of appliances, improved lighting facilities and general redecoration. Also, a model kitchen will be built for display purposes.





Model 150 TCR-r, Roller-Smith breaker (above) in test position with tank lowered after interrupting 6,290 amp. at 14,650 volts, or 159,200 kva. Below—Explosion pot where arc is extinguished by the "Exotherm" principle is being replaced after inspection and shows simplicity of the mechanical design

Boothe said that Kent Clark has come from Illinois to the Brown-Johnston organization and that he will head the new selling program on appliances.

● Manufacturers Marketing Service of San Francisco has secured space at 321-22 Sharon Bldg., according to C. W. Daniel, manager. The company represents Fostoria Pressed Steel Corp., infrared and localized lighting products; Circo Products Co., electrically operated vapor degreasers; Watco Engineering Inc., commercial and industrial lighting; U C Lite Mfg. Co., battery operated portable searchlights; McQuay-Norris Mfg. Co., precision machined parts.

● Resin Industries, Santa Barbara, Calif., has appointed Northwest Plastics Industries, Seattle, as its representative in Washington, Idaho and Montana.

● TRIANGLE CONDUIT & Cable Co. has established Pacific Coast branch offices at Seattle, San Francisco and Los Angeles, it was announced recently by T. H. Bibber, customer relations manager. Rex E. Larsen is district manager at Los Angeles, with headquarters at 923 E. Third St. M. L. Fowler is San Francisco manager, with offices at 1045 Bryant St. Seattle manager is Roger W. Baylee, who is headquartered at 2424 Harvard Ave. N.

● A NEW ELECTRIC APPLIANCE department will be opened about Jan. 1 by the Crescent Department Store at Spokane in fourth-floor space formerly used for storage. Extensive remodeling is being done to house the department, which will carry all types of electric appliances and radios. Manager of the department will be George Hackett, lieutenant commander in the Navy, who is returning to Spokane in mid November.

● EXPANSION costing approximately $8,000,000 has been planned by Bethlehem Steel Co. at Los Angeles, as the beginning of a long-range program on the West Coast, according to H. H. Fuller, vice-president in charge of the company's West Coast steel activities. Construction of a new mill depot at San Francisco was started in October.

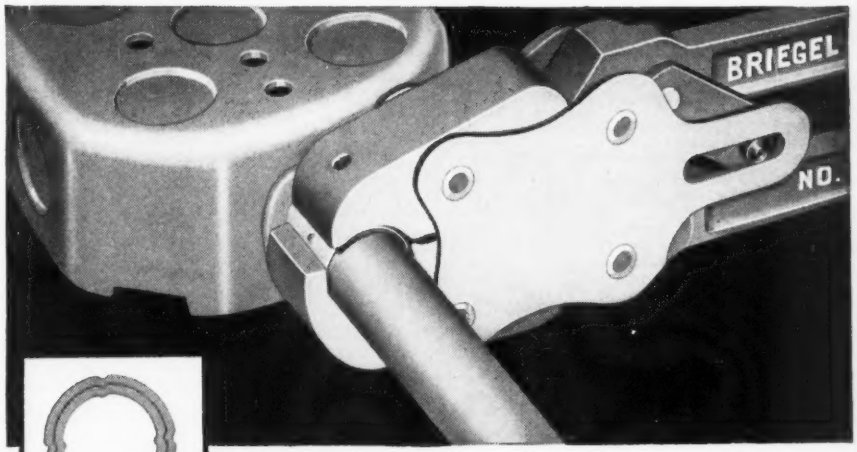
● STEWARD-WARNER Corp. has made distribution arrangements for its home radios as follows: For Butte, Billings and Great Falls, Mont., Treasure State Gas and Electric Co., Butte, Mont., J. J. Kirby and Fred C. Jones, owners; for Phoenix and Tucson, Ariz., Arizona Mercantile Co., Howard Bendalin, owner.

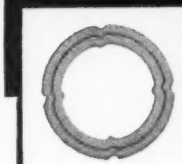
● OWENS MILLER, formerly with Earl S. Condon Co., has gone in business for himself as a partner of the Miller-Joyce Co., Los Angeles, manufacturers' agents for radio and electronic equipment. Address of the business is 901 Commercial Exchange Bldg.

● DALCO APPLIANCE Co. of San Francisco and J. N. CEAZAN Co. of Los Angeles are northern and southern California representatives respectively for Cadillac vacuum cleaners, made by Clements Mfg. Co.

● EDMUND P. CODD, with Washington Water Power Co. sales department for a number of years, has announced that he is opening an electric appliance store in Davenport, Wash.

● WILLIAM WESTON & Co., manufacturer's agents for northern California and Nevada, have moved to 163 Second St., San Francisco 5.





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Electrical Porcelain.

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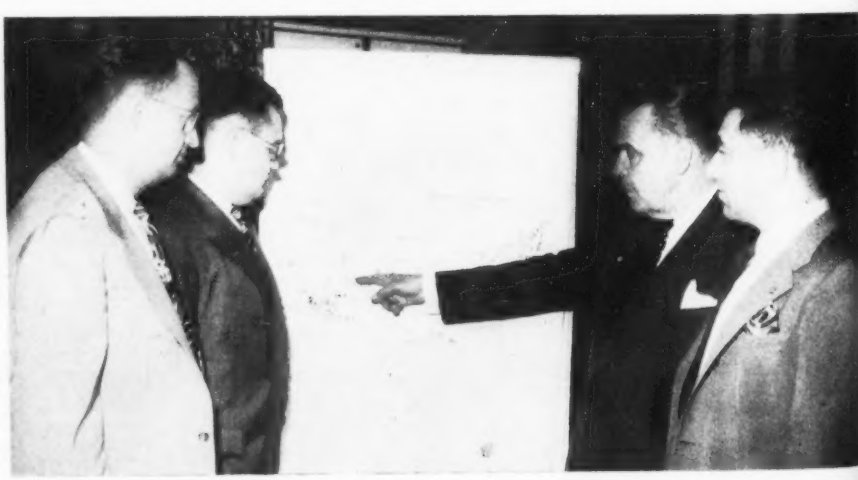
PROFILES *of the month*

Lt. Col. E. G. Stahl, former sales-manager for PG and E in Fresno and now Military Governor of the Steglitz Burough of Berlin, hands the burgermeister an order to abolish all block leaders in that area. Col. Stahl entered the Army in August 1943. A veteran of World War I, when he was in the Signal Corps, he was assigned to Civil Affairs School at Pittsburg University. He went to the European Theater in January 1944, and in July 1944 to France, where he was assigned as commanding officer of the military government attached to the XV Corps. He holds four campaign stars and has received a letter of commendation from the Commanding General XV Corps. As commanding officer of the Steglitz-Berlin Military Government Detachment, he supervises the local district government, activities of the mayor

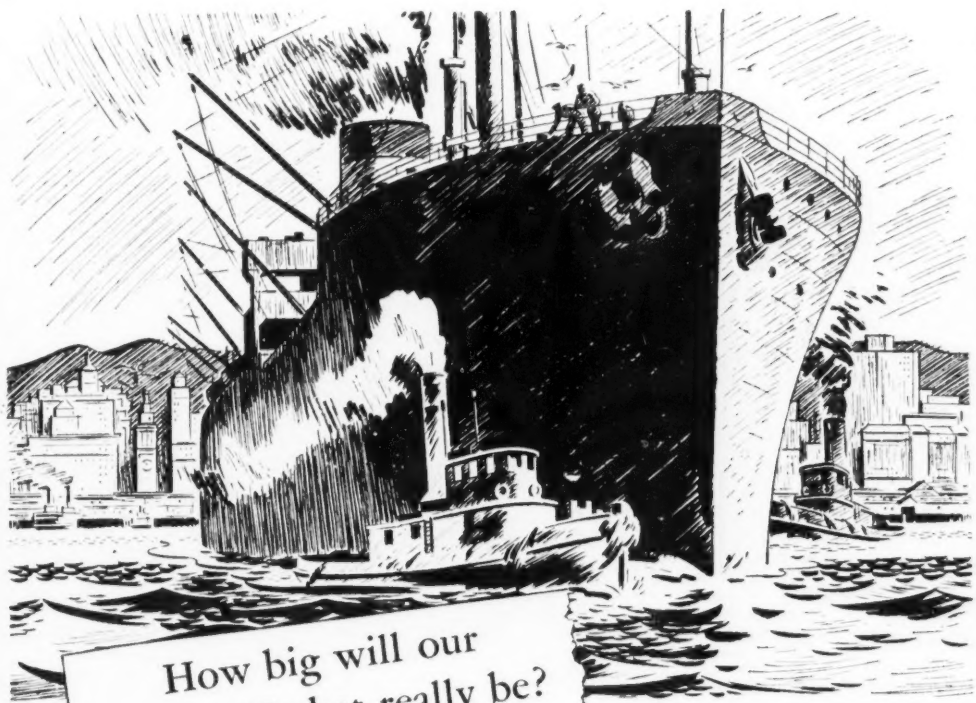
Inspectors all—Art Veit, Los Angeles county; Paul Rodet, Los Angeles city chief of the department; Victor Tousley, secretary of IAEI, Chicago, and Harold Gerber, chief inspector, San Francisco and Southwestern Section secretary, when they all met recently at the Los Angeles half of section's double annual meeting



At meeting of Electromaster district managers, Vice-President Gerald Hulet talks with Western representatives (left to right) Ben Sanderson, California Alex Kuehlthau, Northwest, Albert Solen, Colorado, Utah and Arizona

Northern California Speaks to the Nation

NORTHERN CALIFORNIA...gateway to a billion new customers



How big will our Pacific Market really be?

Economists estimate that America's trade with the billion people who live around the great Pacific Basin can amount to at least seven billion dollars a year... more than double what it did before the war.

The Dutch East Indies, for example, are planning to spend close to two and a half billion dollars for the rehabilitation of their islands. China is making arrangements to buy 300 million dollars worth of heavy machinery. Russia is reported to have earmarked 10 billion dollars to be spent over a 10-year period.

With an eye to these and other expanded markets in Latin America, the Philippines, Australia, Hawaii and our own Western states, 176 firms opened manufacturing plants in Northern California during the first six months of 1945.

For here is the geographical, industrial and financial center of the new Pacific World. Here are the deep-water ports, the cheap power and fuel, the highly-skilled labor pool. Here are tremendous timber, oil and mineral resources. Here, or nearby, are plants capable of producing vast quantities of magnesium, aluminum and steel.

If your business is looking West, investigate the advantages of Northern California. The Pacific Gas and Electric Company will help you in every way possible.

Northern California... industrial center of the new Pacific World

PACIFIC GAS AND ELECTRIC COMPANY

P. G. and E. engineers will help you locate your plant

A well-trained Pacific Gas and Electric Company engineering staff has been built solely to help industrial firms learn the facts about locating in Northern California. This staff works closely with established agencies throughout the entire area, and its service includes at no charge...

A thorough study of available sites; photographs, maps, aerial perspectives.

Complete information on environment, transportation, drainage... trucking and freight rates.

Estimated cost of property, of any necessary improvements, of power and other utilities.

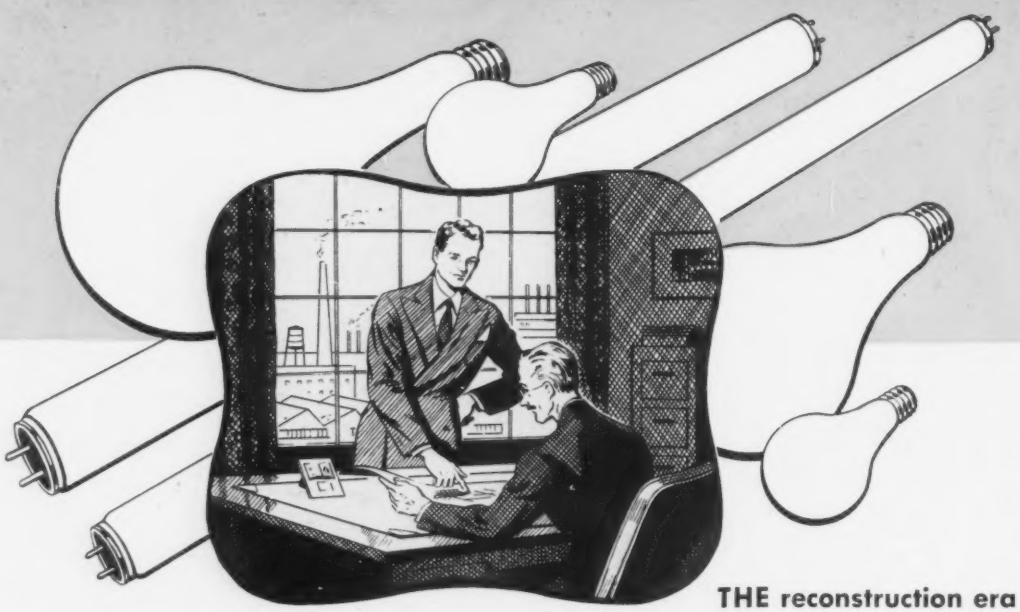
For more information, or assistance of any kind, write Pacific Gas and Electric Company, San Francisco 6, California.

FIRST OF A SERIES of national advertisements by PACIFIC GAS AND ELECTRIC COMPANY which will appear in Saturday Evening Post, Time, Forbes, Business Week, Wall Street Journal and United States News.

EW 48X—1145

LIGHT

MODERN AID TO BUSINESS



THE reconstruction era has started. In cities up and down the Pacific Coast, the owners of office buildings are planning to modernize their properties. ★ Lighting will have an increasingly important part in these plans. ★ Here is an almost unlimited field for the promotional and educational missionaries of the electrical industry. ★ *Some* but not all architects, building owners and tenant-businesses have recognized what correct lighting, modern lighting, can do to increase the efficiency of office workers, insure employee comfort and eye-health and enhance customer or client satisfaction. ★ Good lighting adds up to good business in any man's office. ★ Modern lighting for multiple benefits! ★ ★ ★

PACIFIC COAST ELECTRICAL ASSOCIATION

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